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AMERICA'S YEAR OF DESTINY

The IRON AGE
DECEMBER 31, 1942

The dismal days of early 1942 are behind us...when defeat followed defeat and a complacent, peaceful America was compelled to adjust to the reality of War. Now the tide gives evidence of turning and the road to Victory and Peace lies clearly ahead. How fast we travel this road depends greatly upon the homefront, our conserving of vital materials and foodstuffs; a unified participation in scrap campaigns; ever increasing, uninterrupted production; War Bond purchases by all....the way has been pointed, let's accept the challenge.

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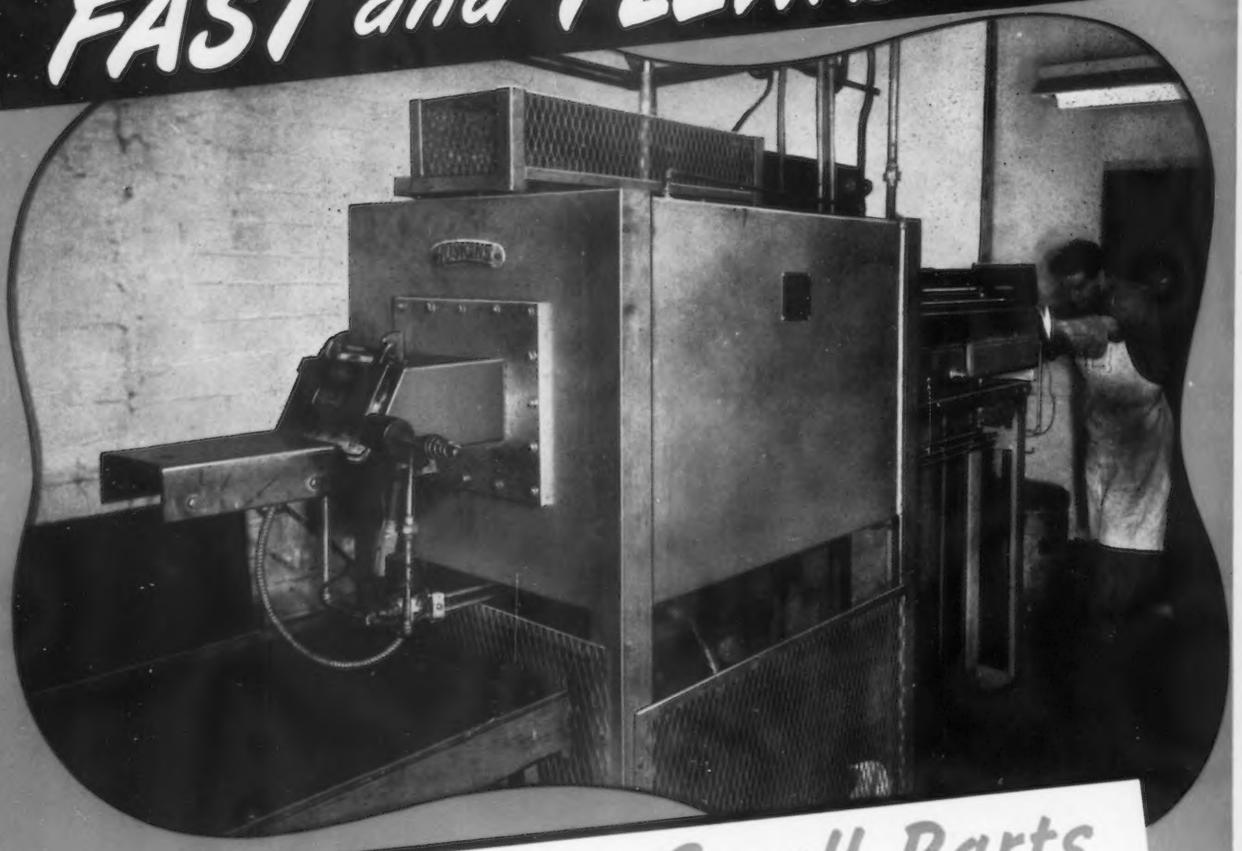

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Record-breaking service on an important Navy order, made possible by Ryerson cooperation on steel! "Without your assistance, it could not have been accomplished," writes the contractor—and again Ryerson teamwork scores.

Cases like this—in which quick Ryerson steel-service has speeded up war production—run into the thousands! While we have not kept count, enough Ryerson customers are working on war contracts to firmly establish Ryerson steel from stock as a vital part of the war production machine.

Hundreds of plants on war contracts are *depending* on Ryerson for steel. An important order here, too urgent to wait on mill production; a few bars there; some strip or a few sheets somewhere else. It multiplies into tremendous tonnage—all labeled "RUSH"—and it's all going into tanks, planes, guns and ships to beat the Axis!

It is a source of pride to the Ryerson organization that its One Hundredth Year finds it on the direct line of greatest service in the war production program—There is a great deal of satisfaction in a War Production Unit report: "Without your assistance it could not have been accomplished."

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THE IRON AGE

DECEMBER 31, 1942

ESTABLISHED 1855

Double or Nothing in 1943

ANOTHER year has drawn to a close; the most eventful year perhaps in the history of our country. Certainly the most eventful year in the history of industry.

It is eventful, primarily, not so much because of what has happened during it but because of the tremendous responsibilities that have been placed upon all of us during the past 12 months of war and because of the effect on the outcome of the war by the discharge of those responsibilities.

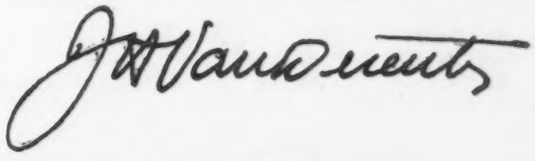
A democracy, such as ours, is a slow starter. The people in a democracy are not trained to the goosestep. But they are fast movers when once under way. And the double quick gets a nation places faster than a goosestep.

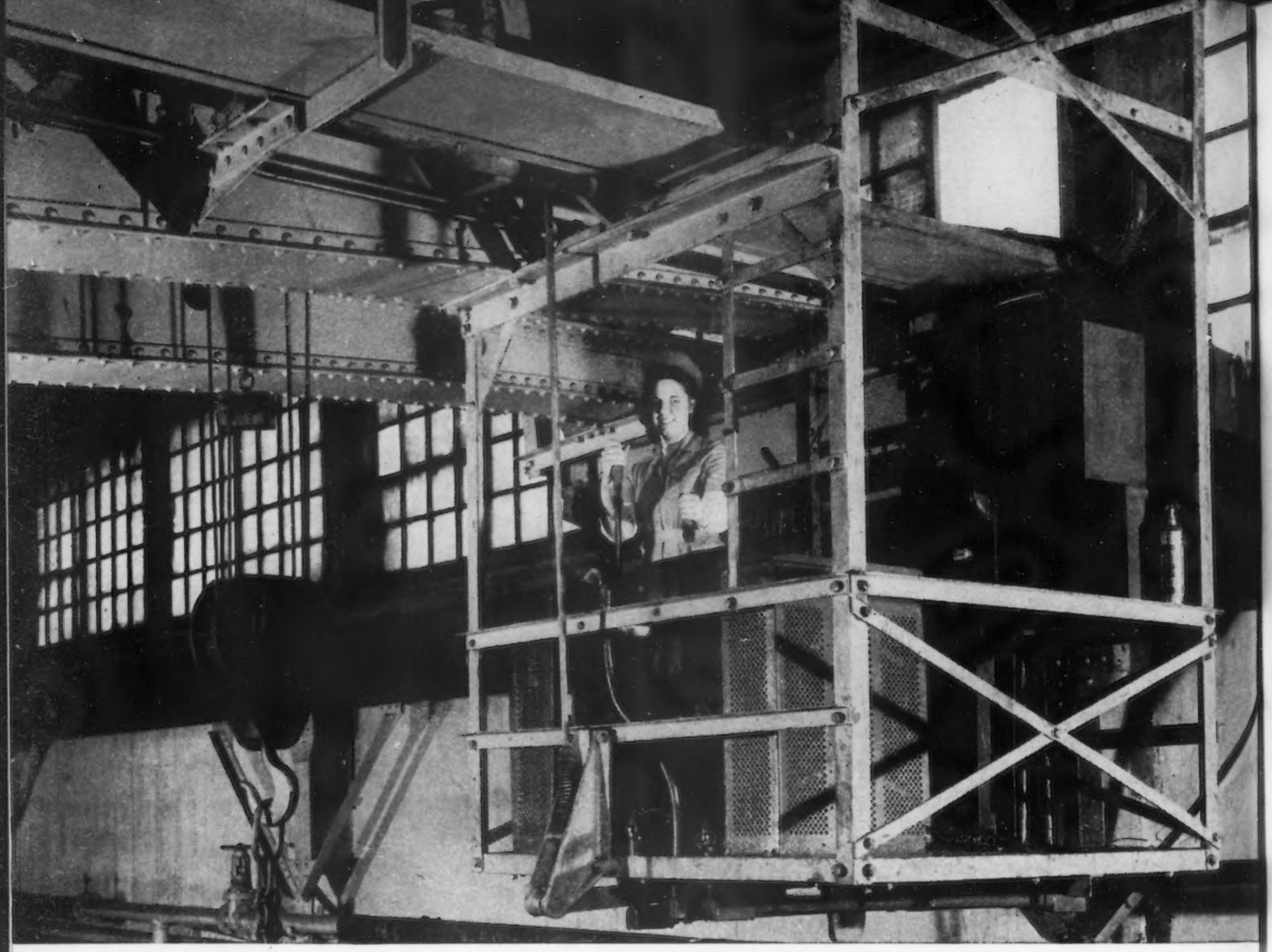
During this past year, our nation has made vast strides toward victory. Our output today of arms, ammunition, ships and other articles of war has already reached a point where it is superior to the combined production of the Axis powers. During the months of the coming year, it will reach a point where it will be double their output.

The war in Europe and Africa will not last long after that superiority in arms production can be brought to bear on the battle fronts. When we have shortly attained the same degree of mechanized superiority that Germany had over France, the Allied tornado will sweep through Germany and her satellite countries with the same devastating speed that carried Hitler's panzer divisions through France.

It will take longer to clean up the Japs, even after Tokio and Osaka and the other cities of Nippon are reduced to piles of smoldering ruins. There will be a thousand islands of the Pacific which will require many months of service by our khaki-clad vermin exterminators to drive the rodents into the sea from their jungle and mountain retreats.

With so many of our boys already overseas and so many more of them getting ready to go there, it would have hardly been appropriate for us to have wished you, as usual, a Merry Christmas. But we can and do wish for all of you the strength of spirit, mind and body that will enable you to face and fulfill the task that lies ahead. You men and women of the metal-working industry have done a splendid job in 1942. We know that you will meet the even larger responsibilities of 1943 with equal courage and success.





Virginia Beard, smiling crane operator, is one of many young women making steel for Victory in the Inland mills.

Meet Virginia . . .

A New Inland Steelmaker

Virginia is in the vanguard of a new "task force" at the Inland mills. She is one of many young women who are filling the industrial ranks vacated by men called to the colors, and men who can be used to greater advantage in other departments.

As Virginia travels her crane back and forth, she responds to the signals of other girls—furnace operators, machinist helpers, threaders, tappers, burring machine operators—from one end of the Bolt and Spike department to the other, even including the shipping crew.

Inland is glad that these young women are able to help relieve the manpower shortage and maintain the output of steel that is so vital to the war effort.

The girls learn rapidly, and are efficient and careful in their work. Because of the variety of jobs they are able to perform in our own mills and shops, Inland does not hesitate to recommend that other companies, not already doing so, consider the employment of young women to keep plant production at top capacity for the duration.

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Pulverized Coal for Metallurgical Furnaces

By RICHARD B. ENGDAHL
Research Engineer, Battelle Memorial Institute, Columbus, Ohio

. . . In this paper, recently presented before the Ohio Valley section and the Open Hearth section of the AIME, the author discusses the economies and advantages of the use of pulverized coal in metallurgical furnaces and outlines some of the recent research and development being carried out on the adaptation of pulverized coal to various applications.

COAL in solid form is the basic industrial fuel because it lies in abundant deposits at the very door of American industry, and thus is, for a large part of the country, the most economical source of heat energy. In some applications it has had to bow to the fluid fuels, oil and gas, because they can be handled conveniently in pipes. Economy is sacrificed for convenience and close control. However, in pulverized form, coal becomes a fluid fuel, and hence carries with it this ease of control as well as its inherent economy.

The cost of heat in coal is, for most parts of this country, less than that in oil. Based on coal having a calorific value of 14,000 B.t.u. per lb. and oil of 150,000 B.t.u per gal. the equivalent prices of the two fuels, delivered at the plant are as follows:

Cost of Coal Per Ton, Dollars	Equivalent Value of Oil Per Gal., Dollars
2	0.011
4	0.021
6	0.032
8	0.043
10	0.054

This tabulation shows, for example that if oil costs 5c. per gallon, one could pay as much as $10 a ton for coal and obtain the same amount of heat per dollar. But, because coal can be obtained in many places for $4 to $6 a ton, dependent on freight charges, the difference between that price and $10 a ton will pay the cost of pulverization, amortize the equipment, and have an appreciable margin of savings over the cost of oil at 5c. a gal.

Coal can, of course, be converted to other fluid forms by gasification, but pulverized coal costs less except when gas is available as a by-product. Hence, in some of the metallurgical industries, pulverized coal has become almost a standard fuel. In the malleable casting field 75 per cent of the melting and nearly 50 per cent of the annealing are accomplished with pulverized coal.[1] Fig. 1 shows a pulverized coal-fired rotary melting furnace, one of the types used in the malleable industry. In 1939 it was reported[2] that 95 per cent of the heating processes in the copper industry employed pulverized coal. Many large steel billet heating furnaces have been so fired for years. Fig. 2 shows the firing end of a recently modernized continuous rail heating furnace using pulverized coal.[3] This has been pointed out as a modern example of a furnace having automatic control of temperature and, to the extent possible in a non-muffle furnace, of atmosphere.[4]

Open Hearth Furnace

These proved successful applications and the advantages of the pulverized-coal flame have long encouraged attempts to apply it to the open hearth furnace. However, accumulation of ash in the checkerworks has dogged these persistent efforts. Fine pulverization of coal and ample checker space with provision for collecting the ash can alleviate this trouble, but it seems unavoidable that gradual accumulations will increase resistance to the flow of gases and decrease output.

The recent description[5] of an open hearth furnace which is recuperative rather than regenerative seems to offer a likely solution to these difficulties. The amount of heat transfer surface required when recuperators are used is much less

than that with checkers. Furthermore, the nature of the silicon carbide tubes makes it desirable to arrange for the flow of gasses to be predominantly vertical instead of horizontal. With the flow in the first pass being vertically downward the top surfaces of the horizontal tubes would be swept clean and much of the ash would be thrown out by centrifugal force in the 180 deg. turn at the bottom of the first pass.

The maximum temperature reached in recuperators is naturally much lower than that in checkers. Thus, the recuperator could operate continuously at a temperature below the ash softening temperature so that the ash would not become sticky and adhere. This is apt to occur in the regenerator which reaches a high temperature just before reversal of the flame. Incidentally, this is the only application where the accumulation of ash has seriously hindered the performance of a furnace using pulverized coal.

Forging Furnaces

The use of pulverized coal in heavy forging furnaces is steadily increasing. This trend has been accelerated by the present transportation difficulties with fuel oil. A modern installation for heavy forging has been described by Herington.[6] However, the bulk of the output of the forging industry is in small forgings such as drop forgings.

It is for this reason that Bituminous Coal Research, Inc., as a part of its program on the industrial utilization of coal, has sponsored a study at Battelle on a very small drop forging furnace.[7] This furnace, shown in Fig. 3, was loaned through the courtesy of the Columbus Bolt Works and is one of a number of such furnaces now fired by oil at that plant. No alterations were made in the furnace other than the addition of a hood and stack connection and enlargement of the burner ports. The furnace hearth was 26½ x 40 in. and the volume of the combustion space was 15 cu. ft.

The furnace was equipped with two burners located on opposite ends of the chamber in the same manner as when oil was used. These burners were offset 3 in. horizontally in order to avoid direct impingement of the opposing flames as well as to induce a swirling flame within the chamber. Fig. 4 is a sectional view of a burner. A pipe carrying the primary air-cooled mixture discharged into the throat of the venturi-shaped burner port. The annular throat between the burner pipe and the port provided entry for a rapidly rotating envelope of secondary air; rotation was produced by supplying air to the wind box tangentially. Wind box pressure was approximately 1 in. of water; furnace pressure ranged from 0.2 to 0.4 in. of water.

Usually, for convenience, a gas flame was used for starting. The gas pilot consisting of a ⅛-in.-diameter orifice was incorporated into the tee in the coal supply line and was connected to the gas main which supplies natural gas at a pressure of 10 lb. per sq. in. When it was desired to use gas for preheating, the pilot could be operated as an inspirating premixing burner which could obtain air through an open branch of a tee in the coal supply line just above the burner. When coal was fired this branch was closed.

The furnace has been started also by building a small fire of wood or coal on the hearth and firing the pulverized coal over the incandescent bed thus formed. When using the gas pilot for starting, the gas could be turned off after the adjacent refractory reached 1500 deg. F., since ignition of the coal was then self-sustaining.

A disk-type feeder supplied pulverized coal from a bin to the primary air fan which delivered the resulting mixture through standard pipe to the burners. Secondary air was supplied by a separate blower, control of which was obtained by a butterfly valve at the blower inlet.

Effect of Coal

Coals from the Elkhorn seam in Kentucky, from the Sewell, Pocahontas Nos. 3 and 4, and Island Creek seams in West Virginia and from the Moshannon seam in Pennsylvania were used. These varied in ash content from 3.5 to 8.0 per cent, in volatile matter content from 16 to 37 per cent, in calorific value from 14,260 to 14,900 B.t.u. per lb., in ash softening temperature from 2300 to 2850 deg. F., and in grindability index from 50 to 110. Little difference was found among them.

When firing the high-volatile coal pulverized to 93 per cent through 200 mesh at a rate of 50

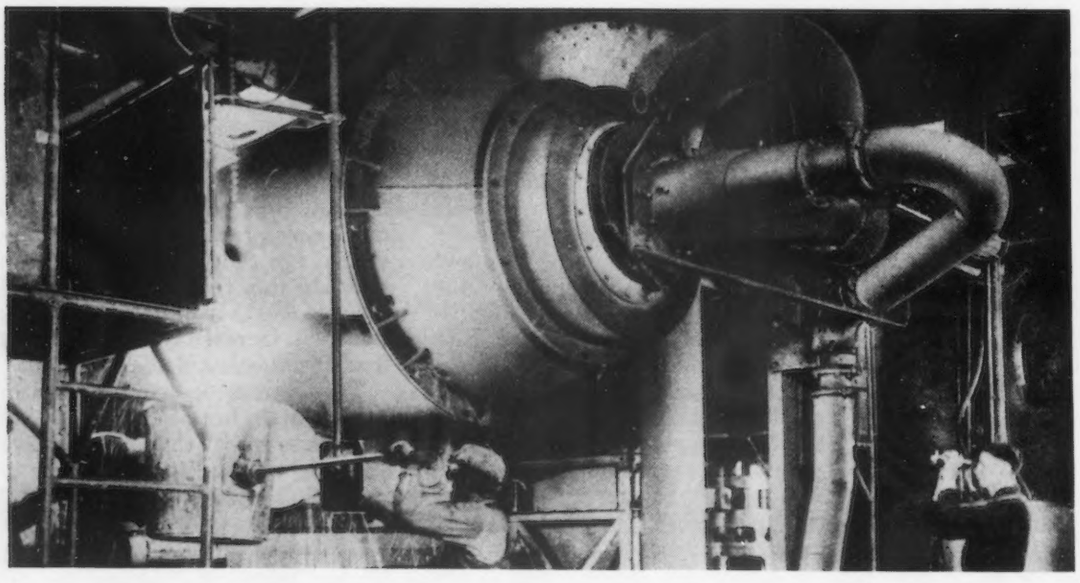

FIG. 1—Firing end of a rotary melting furnace adapted to pulverized coal. *Courtesy Whiting Corp.*

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FRONT view of a 5-ton Brackelsberg furnace. Note pulverizer at the extreme right.

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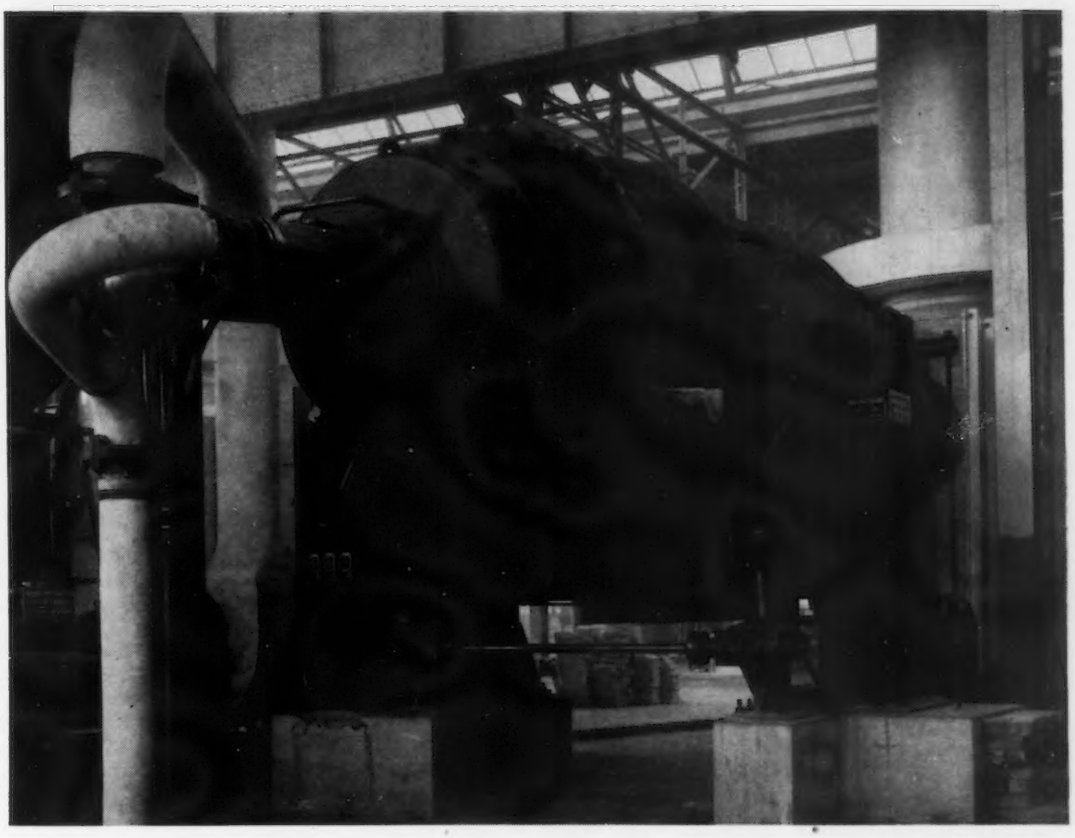
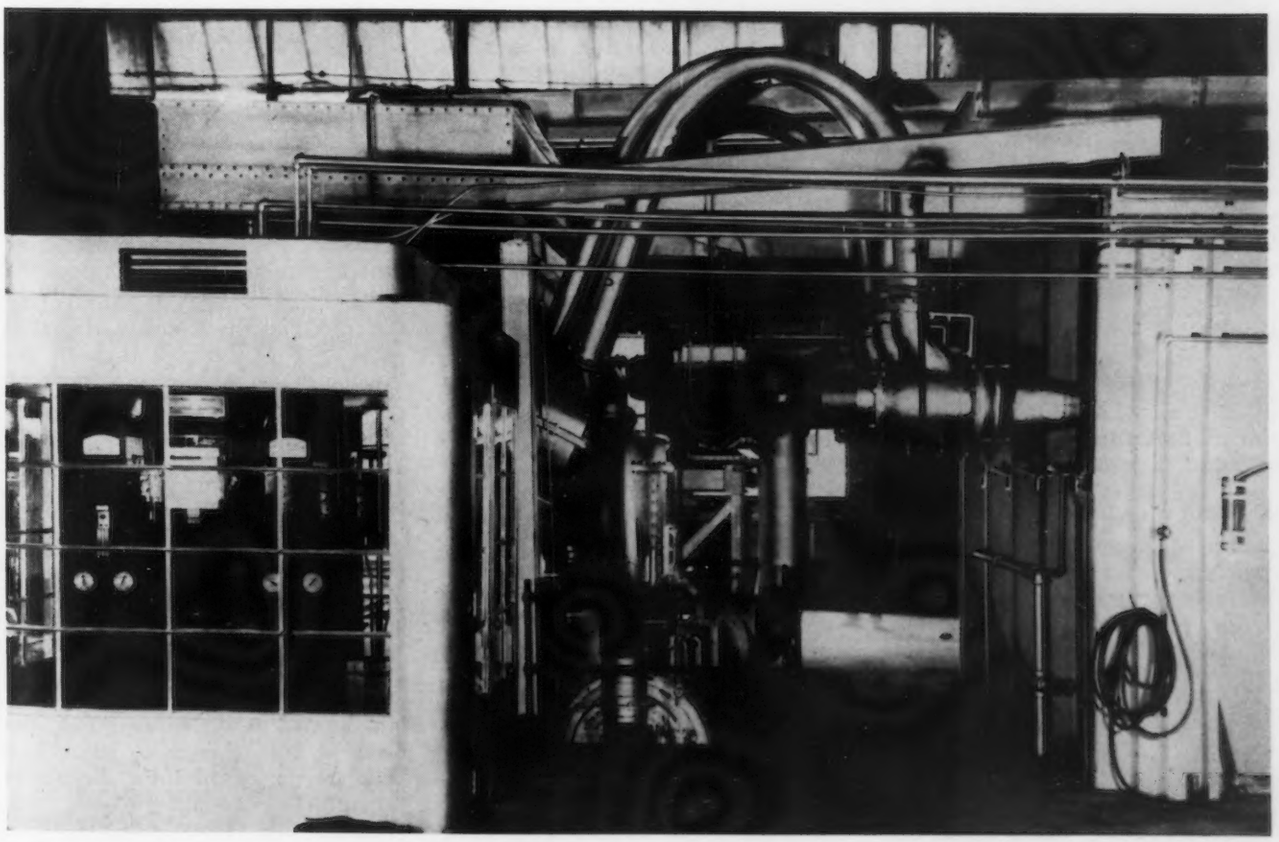


FIG. 2—Burner end of continuous rail heating furnace showing the controls and firing equipment. *Courtesy Amsler-Morton Co.*



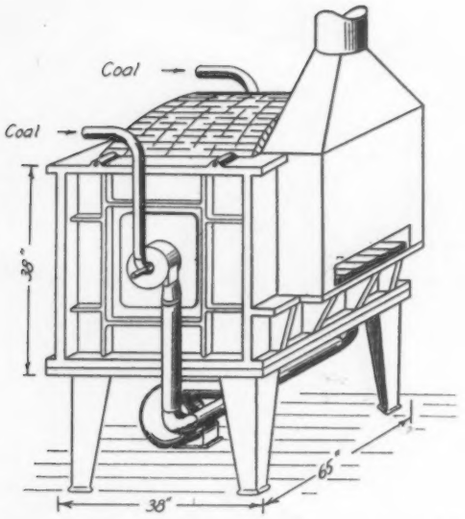


FIG. 3—Slot type forging furnace tested in the Battelle laboratory.

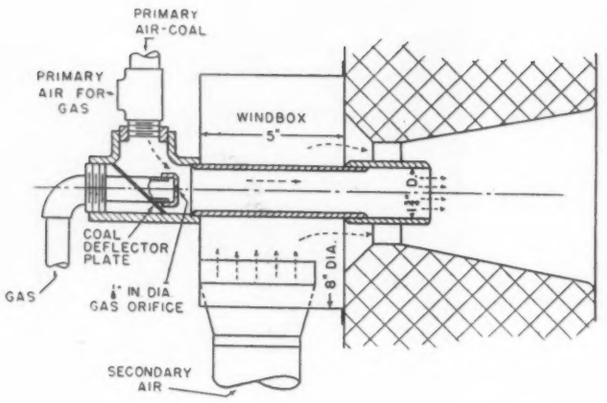


FIG. 4—Cross-section of a pulverized coal burner used on the laboratory forging furnace shown in Fig. 3.

lb. per hr., the furnace could be heated from room temperature to 2300 deg. F. in 1¼ hr. After the refractory was heated to thermal equilibrium, the furnace could be maintained at 2350 deg. F. when empty by firing at the rate of 32 lb. per hr. With the average furnace temperature at 2400 deg. F., a load of twenty 1 in. round steel bars 3 ft. long projecting into the furnace 18 in., was heated to 2200 deg. F. in 10 min. as indicated by the optical pyrometer. The coal-feed rate was 45 lb. per hr. However, the furnace had not yet reached thermal equilibrium when this test was made.

Examination of the bars after removal at the end of the 10 min. showed that scaling was light and that the thin deposit of ash on the bars fell off with the scale during handling. In an actual production test over a four-day period it was found that the furnace could supply steel at a rate equal to that of similar oil-fired furnaces and with substantial savings in fuel costs.

Distribution of Pulverized Coal

The disk-type of feeder which was satisfactory for the tests with a single furnace would not be practicable for supplying many burners. For such cases it is simpler to supply the coal-air mixture through pipes leading from a central point. Pulverized coal when mixed with air can be made to flow through standard pipe over distances of several thousand ft. Three classes of distribution systems utilize this property. They differ chiefly in the amount of air used, air pressure, velocity of mixture, arangement of piping, and type of prime mover. They are as follows:

(1) Compressed air or blowing system.
(2) Pumping system or cool-air-emulsion system.
(3) Air mixture or circulating system.

In the first two systems the mixture is too dense for ignition or burning. Hence, the coal supplied by the pumping or blowing systems is usually received in substation bins, from which coal is fed at the desired rate into a primary air stream leading to the furnace.

The air mixture or circulating system supplies a mixture suitable for ignition at the burner. The Holbeck system, which came into wide use twenty-five years ago, is an outstanding example of this system. Usually air and coal in excess of demand are supplied to the mains by the central fan and feeder. Portions of this mixture are tapped off from convenient points near the furnaces to be fired. The excess continues around the loop and is returned to the storage bin.

Two recent installations of the circulating system[8] eliminated the usual bin and pulverized coal feeders by supplying the coal to the system directly from the pulverizing mill. They are modifications of the Covert[9] system in that the unused coal is not returned to a bin but is continuously circulated until used. The fan which supplies air to the mill is installed with sufficient capacity to circulate the air-coal mixture around the loop in addition. This modification introduces the same advantages of compactness and control which the direct-firing system brought to boiler-furnace practice when it replaced the bin-and-feeder system.

Radiant-Tube Furnace

A comparatively recent development in metallurgical heating is the gas-fired radiant-tube furnace in which the fuel and products of combustion are enclosed in alloy steel or refractory tubes which radiate heat to the work. An artificial atmosphere of any desired composition can be maintained in the work chamber without contamination by the flue gasses.

The coal industry is endeavoring to introduce the economy of coal to this type of furnace through development work now being done by Battelle for Bituminius Coal Research, Inc. The experimental work is being carried on in an experimental radiant-tube furnace which was loaned for the purpose through the courtesy of the Lee Wilson Engineering Company, one of the principal builders of radiant-tube furnaces.

Results of promise have been obtained; satisfactorily uniform tube temperature is maintained; the flow of gasses through the tube is kept high enough to sweep the fine ash out of the tube. No insurmountable difficulties have appeared, and after some further

work this type of furnace can use coal as well as gas.

Through this and other research the coal industry is endeavoring to develop and improve methods for coal utilization so that coal can become more nearly our universal fuel as well as our basic source of energy.

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Induction Heating in Sprocket Hardening

THE problem of hardening the wearing surfaces of sprocket teeth without affecting the ductility of the remainder of the part and of speeds is being solved by an induction heating method and machine developed by the Ohio Crankshaft Co., Cleveland. The Tocco unit shown is being used by the Cleveland Tractor Co. in the hardening of heavy 28 in. sprockets which they furnish in high speed tractors now serving in the construction and maintenance of military airports.

The machine was built to process three sprocket teeth simultaneously. Using a high frequency current applied to the teeth only, a temperature of about 1500 deg. F. is induced. This temperature is maintained for only 10 sec. and the current is automatically shut off. A stream of water is then applied for 10 sec., providing the quench. See Fig. 1. The cycle is so short that conducted heat cannot reach a high enough temperature to affect the balance of the sprocket. By automatic fixture setting, the sprocket moves the next three teeth into position and the cycle repeats.

Great accuracy over the control of the depth of hardening and area of heat treatment is claimed for the machine. Fig. 2 illustrates the hardened zone of a typical sprocket from this machine. The metal is SAE 1045 steel and is hardened to 60 Rockwell C.

Previously these sprockets, which measure 28 in. in diameter and have 20 teeth which are about 1 in. at the base, could be hardened at the rate of only 6 to 8 per hour. By the Tocco method the hardening rate is now said to have improved to about 15 completed sprockets per hour with the additional advantage of greater precision, according to W. A. Stillman, chief metallurgist of the Cleveland Tractor Co.

FIG. 1—Tocco machine adapted for the hardening of sprocket teeth by induction heating. Here the water quench is seen in progress.

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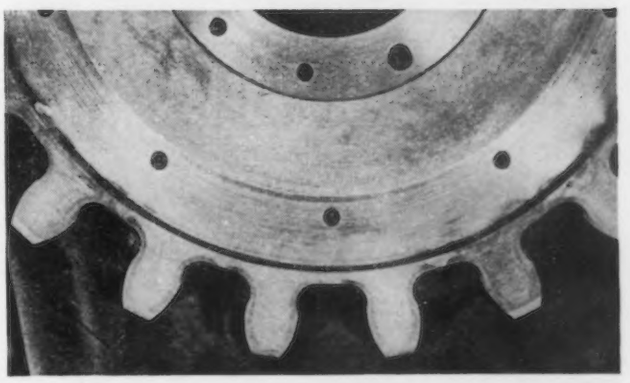

FIG. 2 — Close-up view of the sprocket teeth showing the hardened zone. Great accuracy and control of both depth of hardening and hardening area are claimed for the induction heating process.

2400 Tons of Sinter

COMPLETION of the new and modern sintering facilities recently placed in operation at the Campbell, Ohio, plant of the Youngstown Sheet & Tube Co. will increase materially the daily output of the blast furnaces in the Youngstown district. The new plant, which has a rated daily capacity of 2400 tons of sinter, is an integral auxiliary of the Campbell blast furnace unit of the company.

The function of this plant is to combine flue dust and fine ores which because of their physical size are impractical for charging directly into the blast furnace; then to process these materials and make them coherent by heating the properly prepared material to a partial fusion point while a strong air stream is passed through the mass, thereby forming air cells or pockets throughout the entire mass. The particular advantage in the use of properly prepared sinter is increased output and reduction of fuel consumption in the blast furnace plus the recovery of valuable raw materials which otherwise could not be used.

The blast furnace larry track which carries the cars servicing the blast furnaces with necessary raw materials was extended as a trestle track to the site of the new plant. A 50-ton car driven by a gas locomotive delivers the ores to a trestle hopper. Other materials such as flue dust, coke breeze and scale are delivered on a low level, standard gage track and placed in a truck hopper preparatory to being processed.

Feeders at the bottom of these hoppers deliver material, in proper proportions, onto a gathering belt which discharges to an elevating belt conveyor. This elevating belt conveyor is located outside of the plant proper and is approximately 197 ft. long. The burden from this conveyor is discharged onto a 5 x 14 ft. vibrating screen which removes all material over ½ in. in size. The trestle hopper feeder belts and the feeder belts from the track hoppers may be operated separately or together so that ore and flue dust may be blended in any ratio desired, by controlling amount of feed from each hopper.

The over size material passes

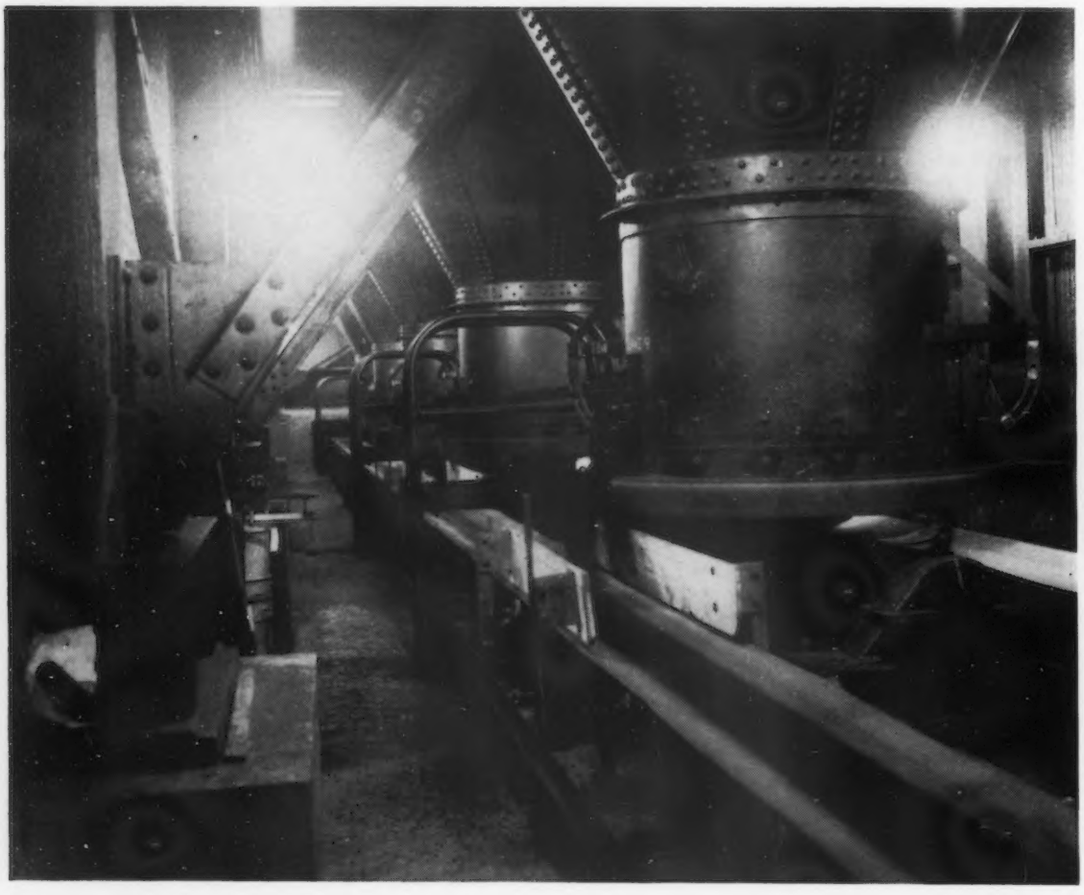

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FIG. 1 — Bin hoppers and feeders, showing material to be sintered being distributed in proper percentages on belt conveyor.

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through a chute to cars and is sent to the open hearth furnaces or the blast furnaces. The fines which pass through the screen fall on another belt conveyor, approximately 64 ft. long, and are discharged onto a shuttle belt conveyor which is above and over the storage bins. By moving this shuttle conveyor back and forth the material may be placed into any one of the seven storage bins on the inside of the plant proper.

These raw material storage bins are 19 ft. in diameter and have a nominal capacity of 450 tons each. Since there are two sintering machines in this plant, there is a separate feeder system for each of them on opposite sides of the storage bins; thus different grades of

. . . Youngstown Sheet & Tube has completed a new sintering plant, materially increasing its daily blast furnace output and reducing fuel consumption. In this article, the plant's operations and equipment are described in detail.

sinter can be made at the same time, or different grades of material may be charged allowing each machine to operate at best speed and desired depth of material on the grate bars.

Under each bin there is a revolving table serving as a circular disk feeder driven by a 600 to 1800 r.p.m. adjustable speed motor. From this point the flow of material is independent for each sintering machine.

Any combination of bins may be placed in operation, discharging their burdens upon the belt conveyors at one time. The amount of material flowing from each bin is controlled by means of a sliding gate. Therefore, by discharging from two or more bins and controlling the flow of material, any mixture of materials with any percentage of each material can be obtained in the sinter mix; for example, two different types of ore, each combined with a given proportion of flue dust, which was blended on the conveyor belt at the trestle hoppers, can now

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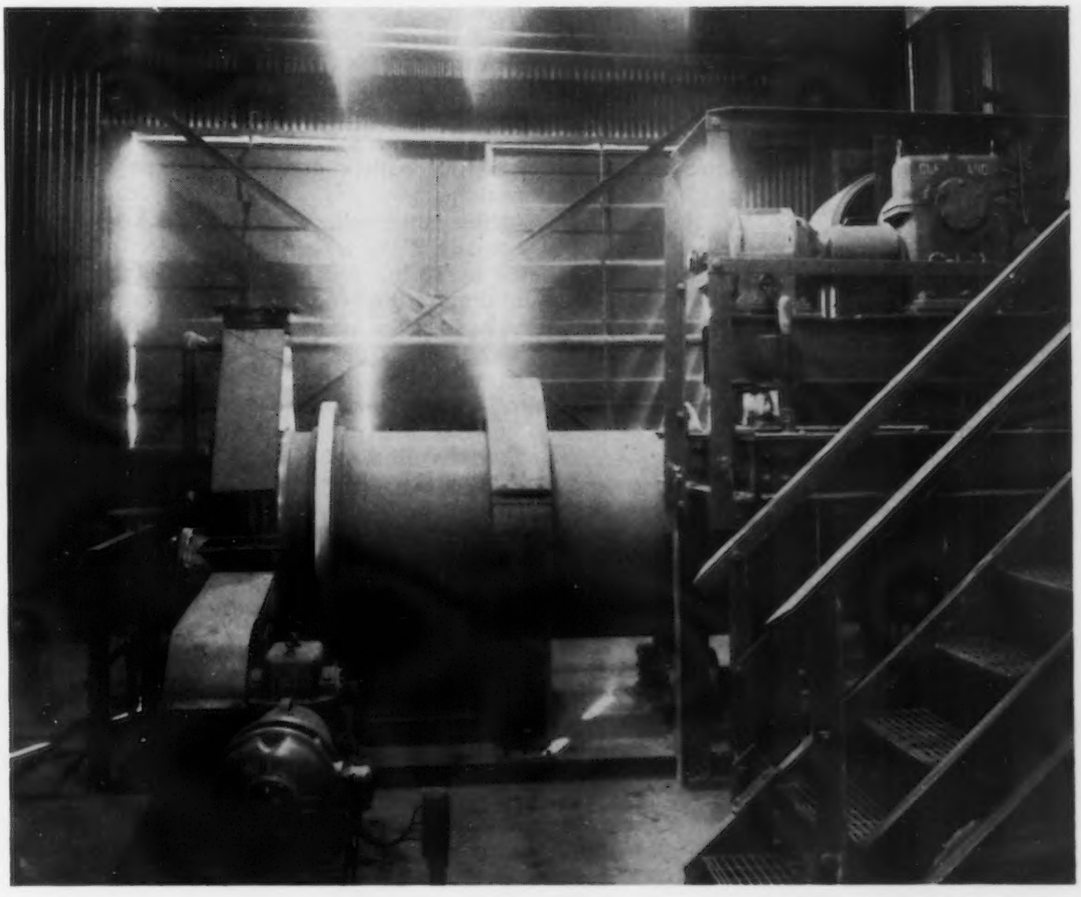

FIG. 2 — Final mixing of presintered material is accomplished in this "fluffer."

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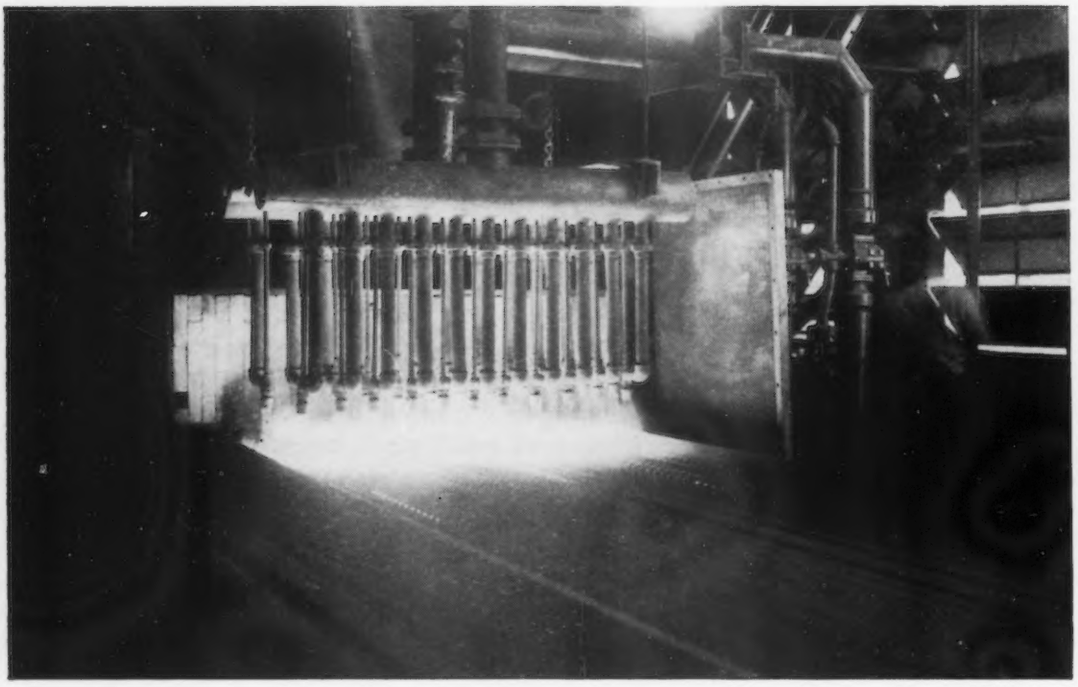


FIG. 3 — Furnace end of sintering machine, showing gas burner arrangement.

be mixed in predetermined percentages and then combined with the desired percentage of coke breeze. The belt conveyors at the storage bins are 24 in. wide and approximately 185 ft. 8 in. long.

The material mixed in proper proportions is discharged onto another belt conveyor (Fig. 1) located at right angles to the conveyor carrying material from the storage bins, and is deposited into a hopper at the primary pug mill along with screenings from the finished sinter which are known as "return fines."

These "return fines" are fed out of a hopper, under the sinter screen at the discharge end of the sinter machine, by a magnetic vibrator conveyor. Dust which is automatically dumped from dust collectors and spillage from head and discharge end of sintering machine is discharged, also, into hopper at the pug mill.

While the volume handled by this belt conveyor is small, it is important to keep the material moving to the pug mill in a constant proportion. Surges of wet and dry material produce an unknown factor and since the operator would be unable to compensate for changes, the uncontrolled operation would result in substandard sinter.

The pug mill mixes the material delivered from the hopper, which is directly above it. Water is added as necessary. From the pug mill, the mixed material is elevated by belt conveyor to a junction feeder from where it is discharged on another belt conveyor and further elevated to the "fluffer" (Fig. 2) where the material is thoroughly mixed and final moisture tempering accomplished. This method of mixing presintered materials makes it possible to produce a sinter suitable to any grade of iron. The "fluffer," directly above the charging end of the sintering machine, discharges the prepared material directly into a swinging chute which spreads it uniformly on the pallets of the sintering machine.

The sintering machines, which are approximately 87 ft. long with grate widths of 72 in., follow the conventional design. For each machine there is a series of pallets, each designed to carry grate bars which form a bed on which the sinter lies. These pallets form an endless carrier, driven by a sprocket at the charging end of the machine, which make a continuous return system.

Material which has been deposited on the slowly moving pallets by the swinging chute is levelled to the desired depth by a stripping plate and then passes under an ignition furnace (Fig. 3). This furnace consists of a series of coke gas burners supplied with high pressure blast air, making them, literally, blow torches in their functional operation.

As the material passes along the machine, which is driven by an adjustable speed-motor giving a variation in pallet speed of 4 to 12 ft. per min., the suction from the draft system, consisting of 12 wind boxes located beneath the pallets, produces a sufficient flow of air downward through the bed, continuing combustion.

The correct mixture of materials is important, and the right amount of carbon must be supplied to complete the sintering operation by the time the material reaches the discharge end of the machine. The carbon percentage is controlled by the blending of varying amounts of coke breeze or other fuel.

Ore to be sintered correctly must contain a sufficient amount of carbon, as otherwise it would not be possible to produce the necessary combustion temperature required to give satisfactory output and efficiency. The sintering machine operator has facilities for producing uniform sinter of the desired hardness and porosity.

Finished sinter is discharged from the end of the machine onto a double deck bar screen and is delivered to a sinter pit (Fig. 4) under an open-yard crane runway where it is loaded by a 20-ton crane and grab bucket into either standard gage cars at ground level, or into larry cars on a trestle track.

The down-draft system consists of the 12 wind boxes which are connected to primary dust catchers by down-comers. Gasses are taken off at the top and then pass through two Sirroco dust catchers and onto

FIG. 4 — Sinter stock pile on which finished material is deposited over a double deck bar screen. Sprays of water cool sinter before it is transported to the blast furnace.

the induced draft fan. The dust and return fines which are collected in this system are returned to the pug mill as described previously.

The fans which produce the draft with which this system is operated have a capacity of 140,000 cu. ft. of air per min. at a 25 in. static head.

Each of these two fans is driven by 1250 hp. motor at 720 r.p.m. These fans have a greater capacity than any used in installations of this character at the present time.

The motor and control room is constructed as a closed system in the interest of overall economy from the maintenance standpoint. This procedure was necessary since the main electrical equipment is high voltage and the air surrounding the plant carries an excessive amount of abrasive dust.

There are approximately 60 motors installed in this plant, not including those operating the bucket crane.

The control of the electrical equipment in this plant is unique in that all main operating motors are controlled at one central point, by the sintering machine operator from the firing floor, immediately adjacent the sintering machine. This system of control includes sequence starting and stopping of equipment with emergency stop push buttons throughout the entire plant. A loud speaker system is employed for giving instructions.

Formation of Hair-Line Cracks

THE work of Musatti and Reggiori, showing that the soaking of alloy steels in hydrogen at 2200 deg. F. followed by rapid cooling through the Ar_1 point results in the formation of internal defects similar to hair-line cracks, has been confirmed by the Alloy Steels Research Committee of the British Iron and Steel Institute. The cracks were not found by the committee in specimens examined immediately after quenching, but only after an aging period. Such defects were not observed when the soaking at 2200 deg. was carried out *in vacuo* or in nitrogen, followed by water-quenching. The conclusions are, therefore, drawn that the cracks cannot be due solely to the stresses resulting from the drastic heat treatment and that hydrogen must be regarded as the major factor operative in hair-line crack formation.

Evidence was obtained that when cracks had been formed they contained hydrogen. Thus, as a result of rapid heating to 575 deg. F., white ferrite veins surrounded the cracks, while after similar rapid heating to 1200 deg. F. globular carbides were observed instead. The suggestion is made that the white ferrite veins are due to decarburization by the hydrogen contained in the cracks immediately after formation. Decarburization results in the formation of methane, which is increasingly unstable above 1110 deg. F. in contact with steel. Accordingly, rapid heating to 1200 deg. results in the precipitation of carbide on the surfaces of the crack. It is therefore to be concluded that carbide segregation along the cracks is a result and not the cause of cracks.

In addition to the white veins of ferrite surrounding the cracks in tempered specimens, quite distinct white filaments of an austenitic character were observed in hydrogen-treated and quenched specimens. The gradual disappearance of these white filaments at room temperature is in keeping with the view that they consist of a hydrogen-rich constituent which owes its stability, at any rate in part, to its hydrogen content.

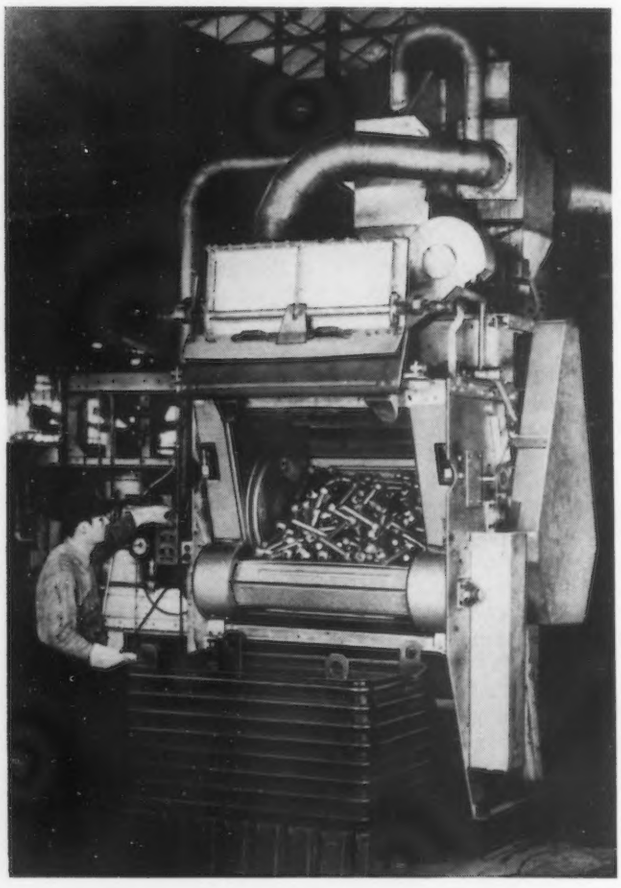
Blast Cleaning Equipment

WAR born steel shortages and the lack of production facilities for repair parts and new equipment have emphasized the necessity for close attention to the maintenance of equipment of all kinds which in any way enter into war production. Because blast cleaning has come to have such broad application in many phases of war production, the maintenance of such equipment to prevent unnecessary repair and replacement becomes increasingly important.

Rapid advances have been made in the improvement of blast cleaning equipment and technique in recent years. Formerly, its use was limited almost entirely to the removal of sand from foundry castings, with sand in a compressed air stream as the abrasive.

Blast cleaning replaced sand blasting as the accepted term for the practice when metallic shot and grit were substituted for sand, and with the introduction of equipment employing centrifugal force rather than compressed air to propel the abrasive.

But blast cleaning is no longer confined to the foundry. It is now used extensively in the heat-treating department, to remove scale; as a preliminary step in plating which provides an "anchor" for final finishes produced by galvanizing, metallizing, enameling; in simplifying the inspection of metal parts by revealing surface defects before machining; in testing for hardness by bringing out soft spots and hardness variations; and after machining, to remove burrs.



BARREL type machines should be loaded to capacity to prevent excessive exposure of the barrel surfaces to the blast. This is a frequent cause of unnecessary wear.

Since blast cleaning is no longer confined to the foundry, interest in maintaining blast cleaning equipment is no longer centered entirely with the foundry. Other departments of the modern metal plant also have a stake in this equipment, and are affected when its performance is not satisfactory.

In all blast cleaning equipment, whether barrel, cabinet or room, or whether employing centrifugal force or compressed air to propel the abrasive, the forces that so quickly clean the metal may, if not properly controlled, speed destruction of the equipment also.

Regular and frequent inspection is necessary for the efficient operation of all blast cleaning equipment. Early replacement of worn parts and the correction of operating ills will prevent shutdowns in the midst of production operations.

All parts of the equipment in the blast zone, whether in a blast room, barrel or special blasting machine, should be shielded from the abrasive in order to avoid direct or rebound abrasive impingement. Sections of the walls of blast rooms, the ends or mill heads of barrels, and the walls of special cabinets should be built up with an abrasive-resistant steel wearing plate. Such plates should be examined regularly, and so installed that they may be changed readily when they wear through, thus preventing passage of abrasive to the equipment proper.

Nozzles, Hose and Lines

When fixed nozzles are employed in a machine using a compressed air blast, they should be installed so as to operate without cross blasting, and checked to insure that abrasive is not rebounding from the work to another nozzle and causing excessive wear. Be sure that nozzles are tightly fastened in their holders. Worn abrasive hose, cut as nipples and fitted over nozzle jackets, affords additional protection.

Abrasive occasionally finds its

—Its Care and Maintenance

By D. C. TURNBULL
Chief Engineer, American Foundry Equipment Co., Mishawaka, Ind.

... Steel scarcity has placed a new meaning on the importance of properly maintaining blast cleaning equipment to prevent replacement. Likewise, broader use of blast cleaning has increased the effect which would result from wholesale equipment replacement on the available steel supply and parts production. The author discusses the component parts of blast cleaning equipment and gives specific, practical pointers on effective maintenance.

way between the threads of the nozzle holder and the nozzle nut, and an operator is inclined to tap the nozzle to remove it. Tapping results in cracking the brittle alloy nozzle insert and once it is cracked, the resultant wear soon terminates the life of the nozzle.

Special care should also be exercised to make sure that the rubber gasket makes a tight joint between the base or flange of the nozzle and the nozzle holder. Without a tight fit, abrasive will escape and cut the nozzle holder and nozzle nut, frequently cutting the outside of the nozzle itself.

The size of abrasive used has a direct bearing on nozzle life. In general, a finer abrasive causes the greater wear. Likewise, abrasive particles spherical in shape are easier on the nozzles, as well as on hose and abrasive lines, than irregular abrasive particles with sharp corners. The primary consideration in the selection of an abrasive should be the type of finish desired on the cleaned piece, but often it may be well to experiment with a larger size, or with steel shot if sand or steel grit is now used. An abrasive may be found that is less destructive to the equipment without serious sacrifice of cleaning speed or finish. Mixing two sizes of grit or shot, or mixtures of grit and shot, will provide variations in finish.

Abrasive conducting hose should be installed without sharp turns or kinks, permitting the bore to be kept full and round to allow unrestricted passage of the abrasive for the full length of the hose. This will minimize the possibility of the abrasive cutting through the hose at a point of restriction. Use of a hose with a special conductive rubber tube will eliminate the building up of static electric charges. Such charges perforate the hose with small holes and may give a workman a serious jolt. Giving an abrasive hose a quarter-turn at regular intervals will markedly increase its service life.

Abrasive lines should be of heavy steel pipe of ample size to prevent undue restriction of the abrasive flow which would result in excessive wear. Use of a "tee" with the unused leg plugged has been found more satisfactory than an "ell" in providing a cushion against wear on the connection. In an "ell" turn, the connection receives the full force of the abrasive as it moves through the pipe.

Compressed Air

One of the most common sources of trouble in blast cleaning equipment is moisture in the compressed air. Trouble from this source, when proper steps are not taken to eliminate it entirely, will vary with a change in atmospheric conditions, being more severe on humid days. Circulation of cooling water through the water-jacket of the compressor and installation of an after-cooler will eliminate much of the trouble. When possible, piping from the compressor should slope slightly in the direction of the air passage, with a water trap installed to catch moisture dropped from the air.

Airless Machines

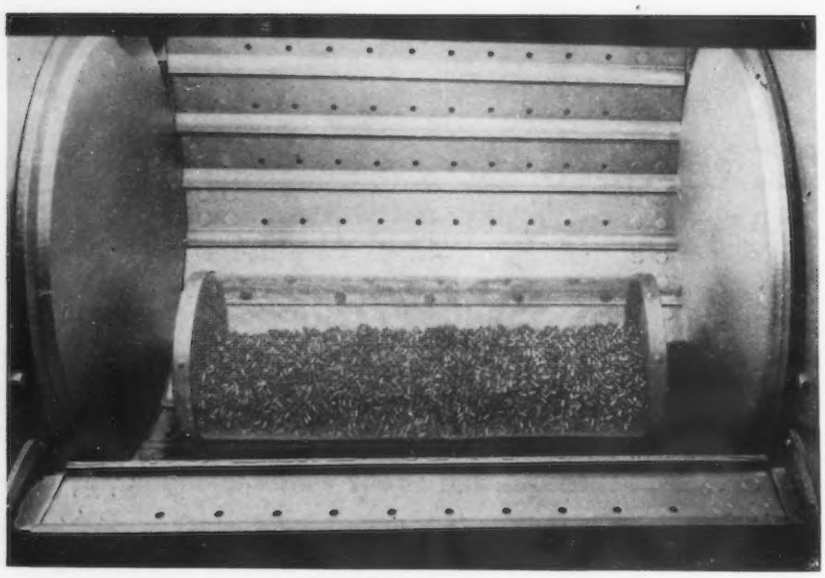
Wheel blades of centrifugal-wheel or airless blast cleaning machines should be inspected every four hours, and oftener when unusual vibration occurs. Badly worn and broken blades cause excessive wear on the wheel plates, and along the blade slots in the wheel plates. They should be replaced. Blade locking screws likewise should be replaced when they become worn and no longer hold the blades firmly in place.

Blades are supplied by the manufacturer in sets, matched in weight within a small fraction of an ounce. Balance of a wheel can be maintained by replacing a worn blade and the blade immediately opposite, making it unnecessary to replace all blades of a wheel. Wheel vibration indicates unbalance, and should be corrected immediately to prevent damage to the bearings and other parts of the machine.

Abrasive Separators

Abrasive separators, to furnish a cleaning agent free of dirt, are finding increased favor in modern blast cleaning installations. In their operation, dirty abrasive from the barrel or machine is passed in a thin curtain over an inclined shed. The abrasive, in flowing off the shed, passes over an air duct while falling into the storage section. The air, passing through the abrasive curtain, carries away the sand, dirt and abrasive fines into a settling chamber, permitting only clean abrasive to reach the hopper from which it is fed to a wheel in airless equipment, or to the compressed air stream for air pressure blasting.

The discharge orifice to the separator should be adjusted to provide as even a flow of dirty abrasive over the shed plate as possible. Occasional checking of the orifice and of the perforated plate above the orifice will make it possible to



AN example of loading a barrel type machine with extremely small pieces. The mesh cage simplifies the loading operation and prevents the small parts from damaging each other or the machine during the blasting operation.

eliminate any accumulated foreign material.

The volume of the air exhausted from the separator vent will determine the amount and particle size of the material removed from the abrasive stream. The size of abrasive used in the cleaning operation, and the size of the particles to be removed, will determine the maximum exhaust. If examination of a handful of the material discharged by the separator reveals grains of full-size abrasive, the exhaust is too high. Likewise, if a similar check of the abrasive flowing to the hopper reveals dust, sand and abrasive fines, the volume of air exhausted is too low or the adjustment in the separator should be altered.

Ventilation

Proper ventilation is essential to efficient operation of blast cleaning equipment. Dilution of the abrasive with sand, scale and other foreign material not only retards the work by reducing the efficiency of the abrasive, but smudges the work. It also speeds wear on abrasive lines and hose, and on nozzles or wheels throwing the abrasive. Without proper ventilation, uncontrolled dust will escape from a machine barrel, cabinet or blast cleaning room into the plant, there to cause wear on other machinery and make working conditions hazardous.

Frequent examination of the abrasive before it returns to the airless machine's wheel or to the compresed air stream, as well as examination of the material collected by the dust collector, will afford a good indication as to operating efficiency of the ventilating system with respect to the abrasive.

This test will not, however, indicate the efficiency of the dust collector with respect to cleaning the air passing through it. A dust collector's efficiency is determined not by the volume of material removed from the air, but by the purity of air released after passing through the collector media. Tests to determine efficiency of the collector are necessary where the air is returned to the plant, or where exhaust of an excessive amount of finely divided dust particles would be objectionable to others in the neighborhood.

The piping system should be cleaned thoroughly every two or three weeks when the blast cleaning equipment served by the ventilating system is used eight hours a day—and cleaned oftener when used on high production schedules.

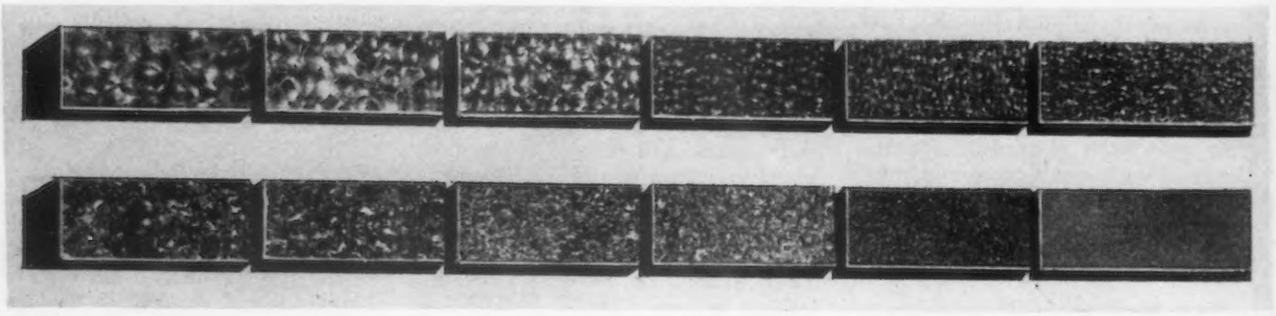
Blast gates in branch pipe lines to individual blast cleaning machines or cabinets should be periodically checked to insure proper distribution of exhaust capacity of a central collection system servicing several pieces of blast cleaning equipment. Excessive pipe wear from high velocities of dirty air will occur if it is necessary to close any branch gate more than half way. In such cases, it is advisable to decrease the velocity by partially closing the main gate at the exhaust fan.

Regular inspection should include piping, with particular attention to joints and connections, to detect corrosion, wear or damage that would result in leakage; blast gates and dampers, for proper setting; collecting elements and their supports, to detect wear and insure proper alinement; and exhauster, to determine proper connection to power source.

Loading Barrel-Type Machines

Care should be exercised in loading barrels and machines in which the work being cleaned is tumbled. A full load is to be preferred to a partial load, the work affording protection from the blast to otherwise exposed parts of the barrel or

THE size and type of abrasive determines the finish which blast cleaning will produce. In the top row, the finishes were obtained by the use of shot, while the examples in the lower row were produced with grit. Both types of abrasive were used in progressively smaller sizes to produce the variety of finishes shown.



mill. Special care should be taken with irregularly shaped or excessively long pieces, as such work has a tendency to nest.

Several steps may be taken to prevent breakage of fragile parts in tumbling: small pieces of rubber hose will break the fall of fragile castings; several pieces wired together may be tumbled safely where single pieces may break; the mill may be slowed; and mixing heavy pieces with fragile parts should be avoided.

Motor Care

A full discussion on care of motors powering blast cleaning equipment is not within the province of this article. Maintenance steps would vary somewhat by type of motor installed, and specific instruction sheets generally are available for each motor. However, a few general maintenance suggestions applicable particularly to blast cleaning equipment should be followed.

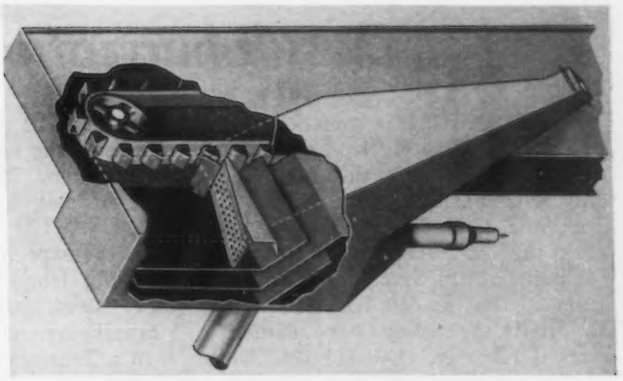
Motors are installed on blast cleaning equipment by the manufacturer with due regard to the load they are expected to carry, and with proper consideration given to convenience in inspection and repair. After equipment is installed in the plant, however, some of these conditions might be changed by equipment arrangement and operation without due regard for the motor's limitations.

Be sure that proper ventilation of the motor is not prevented by piling restrictive material around it. Connections should be checked regularly to make sure that they do not become loose with equipment vibration.

On motors of late design, there is greater danger in over-lubrication than in insufficient lubrication. Excess lubricant applied to bearing housings may be carried into the motor, to lodge on the windings where it catches dirt and promotes motor failure.

Suction is to be preferred to compressed air for frequent cleaning of motor air ducts as damage to the motor may be caused by blowing abrasive and metal chips into motors when compressed air is used.

An ammeter installed on motors called upon for severe service will provide determination of the exact load at all times, lessening the danger of a motor burn-out.



A TYPICAL abrasive separator using a shed plate and air blast to separate the fines and undesirable elements from the abrasive.

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AN example of wear on the side plate of an air-less machine due to the rebound of abrasive.

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IN assembly operations performed on conveyors it is often necessary to turn the apparatus being assembled so that it can be worked on from both sides. A case in point at the Westinghouse small motor division is the assembly of skids or wooden base plates to the feet of small motors. To expedite the work, a dolly mounting a turntable rolls along the side rails of a slat conveyor. After the motor has been placed on its base plate on the dolly, two nuts on the base plate bolts are tightened by a hinged socket wrench. The assembly is then revolved on the turntable, and the two nuts on the opposite side are tightened. The assembly is then slid off the dolly onto the conveyor.

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Desulphurization with Acid Slags

ALTHOUGH it is generally assumed that pig iron and steel can be satisfactorily desulphurized only with basic slags, the British *Iron and Coal Trades Review* reports that R. Durrer and B. Marincek point out in *Stahl und Eisen* of June 25 that in collaboration with H. Hellbrugge they have demonstrated (Archiv, 1940-41) that the use of acid slags for this purpose is not only feasible, but actually results in much lower S values than those usually obtained with basic slags. This desulphurization reaction may be described by the equation, $FeO + SiO_2 + 2C = Fe + SiS + 2CO - Q$, the S content varying with temperature as shown for six slags with increasing acidity, up to a slag consisting of pure silica. The reaction is practically complete above 3090 deg. F.

Composition of Slags Tested

Slag No.	1	2	3	4	5	6
CaO	25.56	28.73	30.12	38.86	36.85	27.46
SiO_2	54.30	49.70	48.52	42.15	41.16	52.40
Al_2O_3	18.70	20.70	20.70	18.58	20.31	21.01
$CaO : SiO_2$ ..	0.488	0.578	0.621	0.920	0.896	0.524

High temperatures thus favor the degree of acid desulphurization, and other conditions being unchanged, reaction with suitably fluid slags is found the more complete, the greater the concentration of silica. With high-silica slags, a temperature of about 3275 deg. F. is necessary. Increasing fluidity of the slag facilitates desulphurizing, and the more viscous the slag, the slower is a required sulphur content reached. Slag fluidity is also desirable to facilitate the escape of silicon sulphide and CO, the gaseous products formed, for the greater the elimination of these constituents, the more complete is the reaction.

Since the normal temperature used for this reaction is not high enough, either it must be raised or the viscosity of the slag reduced by the addition of fluxes. Good results are hence obtained where the slag is hotter than the iron. The previous work of the authors has already elucidated the general principles of desulphurizing with acid slags at high temperatures, and the present paper deals more specifically with what flux additions can be made to the charge to reduce the viscosity, and hence the temperature, so as to arrive at the same degree of desulphurization. The effect of the volume of slag used is also investigated.

In the experimental work carried out, pig iron and synthetic slags were used, and melts made in graphite crucibles with 0.1 per cent S in a Tammann furnace. To slags (5 oz.) fused with fluxes and raised to the required temperature of either 2910 or 3090 deg. F., a charge of 5 oz. of cold pig iron was added. After about 5 min. the initial temperature drop had been recovered, and the working temperature was again reached and maintained until the charge was poured into a mold. The temperature of 2910 deg. F. was checked with Pt/PtRh thermocouple wires suitably protected in a sealed sintered corundum sheath enclosed in an outer carbon sheath, while the 3090 deg. temperature was measured by a graphite rod immersed in the charge and the base observed with a radiation pyrometer calibrated up to 2910 deg. After adding the pig iron, the slag commences to foam with the evolution of a combustible gas as a white cloud with a smell of SO_2.

Experiments at 2910 deg. indicated that desulphurization was much improved by adding fluxes, for the viscosity was diminished and the reaction accelerated. The S values were, however, still too high, for an initial S of 0.48 per cent was not reduced to below 0.1 per cent S. NaCl, Na_2CO_3 and KCl only slightly improved desulphurization owing to their low melting and vaporizing points. Fluorspar gave much better results, the addition of only 1 per cent CaF already giving a good reaction. On the other hand, the 3090 deg. melts gave much lower S values. The slag compositions are given in the accompanying table. Reaction time in each case was 30 min. with pig iron containing 0.620 per cent S. The fluxes added were sodium carbonate, fluorspar and titanic acid in quantities from 3 to 6 per cent of the total quantity of the slag.

With acid slags 1 and 2 (see table), almost complete desulphurization resulted on adding suitable fluxes, the same action being obtained with the more basic slags without adding fluxes. The non-flux slags only give good desulphurization if they do not contain too much free silica, that is, when they are not too acid and hence too viscous. For this reason, slags 1 and 2 give comparatively unsatisfactory results, while almost complete reaction was found with slags 3 and 4. The addition of fluxes was thus effective only with slags 1 and 2.

Sodium carbonate appeared to have no effect whatsoever, and with the more basic slags the addition of this flux even adversely affected sulphur removal. The low vaporizing temperature is one reason for this, as well as the fact that the carbonate or Na_2O as a base links up with part of the free silica and removes it from the reaction zone. Fluorspar improves desulphurizing, this being particularly marked with slags 1 and 2. The addition of titanic acid also gives almost complete sulphur removal, but it is not clear whether the acid acts as a flux or not.

The quantity of slag used in these experiments was rather high, one part by weight being present for every part by weight of iron, but experiments made with two acid slags (2 and 4) and a pig iron with 0.620 per cent S at a temperature of 3090 deg. and with a reaction time of 15 min., showed that the amount of slag had practically no effect on the course of the reaction.

Time affects the reaction, and tests made with the slightly acid slag 5 and the very acid slag 6 indicated that while desulphurizing is practically complete with the former after 180 min., slag 6 is so viscous that complete sulphur removal is not attained even after this long time. In the use of basic slags, the sulphur gradually accumulates in the slag, the latter thus slowly losing its efficacy, but with acid slags the S does not remain in the slag and the efficiency of the reaction does not therefore suffer, provided the silica used is replenished.

One disadvantage of these experiments was that in the small Tammann furnace used, the comparatively high radiation losses caused the slag to be colder than the iron charge, whose temperature was the one measured. The slag might thus have been 210 deg. F. colder than the charge, so that its viscosity is higher and hence desulphurization less effective than if the two were at the same temperature. The difference between the two temperatures also varies, being greater at the start than later, when the furnace cover also becomes heated. While the conditions under which these experiments were carried out were not ideal, they do show that acid slags can be used for desulphurizing, although it is still doubtful how far the results obtained can be confirmed at the slag temperatures used in commercial operation. Acid desulphurization is only satisfactory if the conditions favor the formation and escape of the Si sulphide. For this the slag must be sufficiently fluid, such fluidity being readily obtained by the addition of fluxes. Moreover, in smelting, the sulphide must not sublime within the charge, as otherwise it remains in the molten metal. This occurs in the blast furnace and is probably the reason why acid desulphurization cannot be employed with it, although it is applicable to electric low-shaft furnaces.

Extension of the reaction time is more effective in acid desulphurization than in basic, since the S does not remain in the slag in the former process. For the same reason the quantity of the acid slag does not influence desulphurization. The well-known advantages of an acid furnace, which are particularly marked at high temperatures, are also derived by using an acid procedure. The work outlined in this paper was carried out in co-operation with the Neunkircher Eisenwerk.

Effect of Thorium on Cast Iron

IN research on the effect of thorium on gray cast iron, carried out by W. Baukloh and H. Meierling (*Die Giesserei*, March 20, 1942), test melts were prepared in a cupola (capacity 5 tons per hr.) with receiver, and the thorium added as briquettes held down in the charge by a box at the end of an iron rod. Stirring with the rod insured thorough mixing with the charge. The additions were from 0.2 to 1 per cent thorium element; larger percentages would have been too costly and would also have introduced metallurgical difficulties, since the melting point of thorium is very high and a relatively high percentage in cast iron would have considerably raised its melting point.

From each melt, four vertical bars, 650 mm. long and 30 mm. diameter, were cast, and there tested for transverse strength and deflection. The broken transverse bars were then used for tensile and Brinell tests. Thorium has a high oxygen affinity which caused high melting losses under the conditions of these experiments. Chemical analysis of the finished melts showed that, after pouring, the cast iron contained no thorium. Data have therefore to be based on the thorium added, especially since thorium, like cerium alloyed metal, exercises predominantly a refining action on gray cast iron. Some graphite refinement also appears to take place, and in making malleable iron thorium slightly accelerates malleableizing.

The two mixtures from which test pieces were prepared consisted of: A—160 kg. Deutsch III iron, 25 kg. 11 per cent Fe-Si, and 315 kg. iron scrap; B—140 kg. foundry No. III iron, 20 kg. HK iron, 25 kg. 11 per cent Fe-Si, and 315 kg. iron scrap. Analyses of the finished melts and the corresponding Brinell values are given in the accompanying table. The analyses show that the Si, Mn, P and C are practically unchanged, but that with increasing additions of thorium the sulphur is progressively reduced, desulphurization being closely comparable to that obtained on adding the same amounts of cerium alloyed metal. The thorium seems to improve the transverse strength, the deflection and the tensile strength. On adding 1 per cent Th, the transverse strength is raised 8.9 per cent in series A and 6.6 per cent in series B, the deflection being raised 1 and 2 per cent respectively. Under the same conditions the tensile strength is raised by 11.2 per cent in series A and by 8.3 per cent in series B. Brinell hardness is substantially unchanged by the addition of Th. But with increasing Th the shrinkage of the iron increases, causing a greater liability to porosity at section junctions. The viscosity of the iron improves with additions of between 0.4 to 0.6 per cent Th, but falls again when more Th is added.

Improved mechanical properties may in part be due to the better degasification of the molten charge, as already suggested by Piwowarsky. Why the iron should have more life is not clear; it may be associated with the gas and the sulphur contents of the iron. At the same time, owing to the high heat of combustion of the Th, the iron on pouring becomes hotter rather than colder. Heat may be evolved not only by reaction of the element Th, but also by its compounds.

COMPOSITION OF TESTPIECES

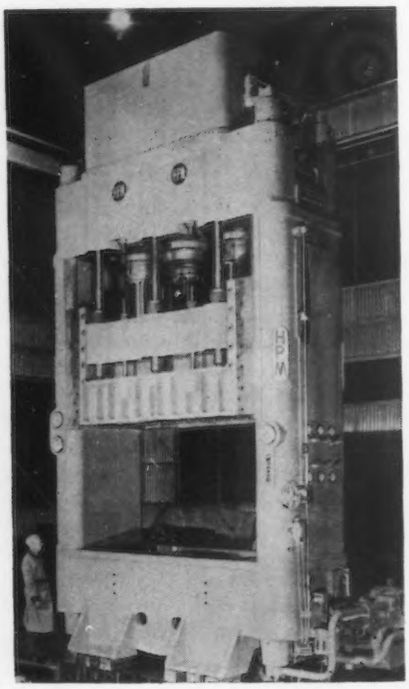
No.	Th Added, Per Cent	Analysis of Cast Iron					Brinell Value
		C	Si	Mn	P	S	
				Series A			
1	0.0	3.14	2.99	0.41	0.95	0.15	199
2	0.2	3.18	2.98	0.41	0.95	0.12	199.5
3	0.4	3.18	2.94	0.42	0.93	0.11	200.5
4	0.6	3.14	2.95	0.43	0.94	0.11	199
5	0.8	3.18	2.96	0.45	0.95	0.12	193.5
6	1.0	3.14	2.97	0.45	0.96	0.10	193
				Series B			
7	0.0	3.20	2.76	0.45	0.41	0.12	206.5
8	0.2	3.20	2.80	0.44	0.40	0.11	202
9	0.4	3.20	2.77	0.42	0.42	0.11	203
10	0.6	3.18	2.78	0.43	0.43	0.09	203
11	0.8	3.18	2.76	0.45	0.41	0.10	203
12	1.0	3.20	2.77	0.44	0.41	0.08	200

New Equipment . . .

Presses

Herein are described new developments in hydraulic presses, pumps, shears and dies.

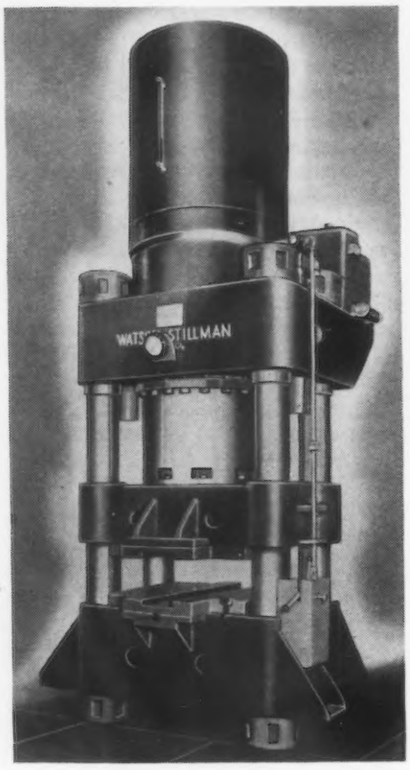
A SELF-CONTAINED H-P-M Fastraverse deep drawing press for sheet metal, equipped with blankholder and die cushion for drawing large, deep metal airplane parts has been announced by the



Hydraulic Press Mfg. Co., Mount Gilead, Ohio. A matched punch and die set is employed with this type of press. A ring, carried by the blankholder slide, holds the blank while the part is drawn. Usually the part is completely drawn from a flat blank to the required shape in a single press stroke. The hollow press bed is fitted with a hydraulic die cushion, which can also be used as an ejector. The pressure resistance of each of the six blankholder rams can be adjusted individually and independently. One hydraulic pump is required on this press. Press reversal is accomplished without the use of an operating valve. The output of the radial pump is reversed instead.

Forming Press

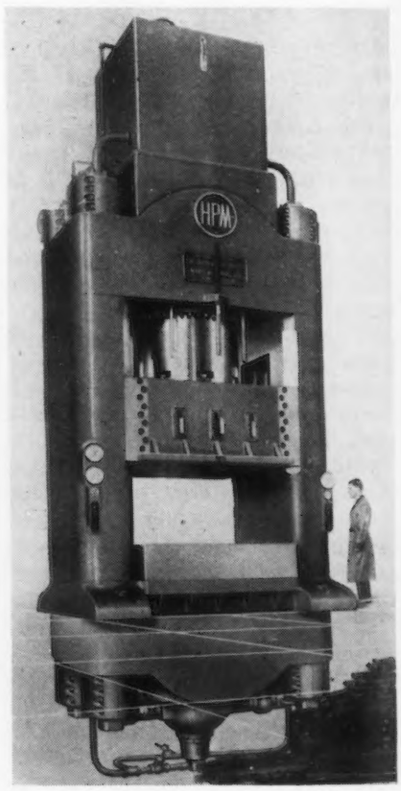
A 1300-TON forming press which can be automatically or manually operated has been recently developed by the *Watson-Stillman Co.*, Roselle, N. J. It is arranged for single cycle automatic operation or manual control as required. The unit is self-contained including a 50-hp. motor and radial piston pump delivering 45 gal. per min. Control is by a single lever latch-operated by a pressure cylinder. The press is of the vertical four-column type. Its ram of 35 in. diameter exerts a pressure of 2750 lb. per sq. in. with a 22-in. stroke.



Opening is 37 in. with a clear platen area of 48 x 42 in. Advance and return speeds are 650 in. per min., with a pressing speed of 10.5 in. per min.

Metal Drawing Press

THE HYDRAULIC PRESS MFG. CO., Mount Gilead, Ohio, announces the completion of one of the largest self-contained deep metal drawing presses. This press em-



bodies two hydraulic actions—a 3500-ton downward acting die platen and a 1000-ton hydraulic die cushion in the press bed. With die cushion idle, the press can be used for single action pressing. The slide is guided by beveled ways on the four inner corners of the uprights through adjustable gibs, so positioned as to oppose any twisting of the slide. Oil trapped in the die cushion cylinder is intensified by the downward movement of the main slide. Use of a compound press ram permits the use of two main slide pressure ranges, one up

to 1000 tons, the other up to 3500 tons. These pressure ranges can be applied in sequence or independently. The press is capable of drawing heavy steel plate to a depth of 18 in. The H-P-M closed circuit hydraulic system is used.

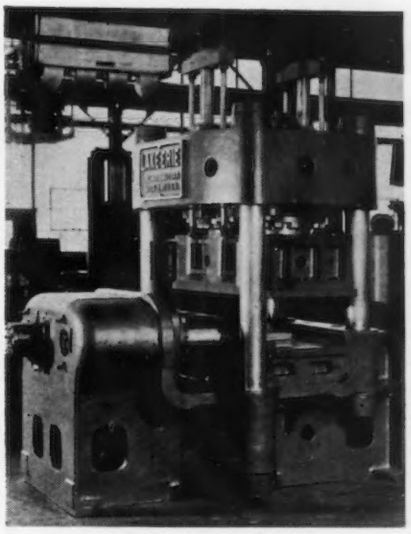
Multi-Purpose Press

A MULTI-PURPOSE, open-side hydraulic press designed for widely varying operations in the fields of assembling, pressing and straightening has been announced by the *Denison Engineering Co.*, 1152 Dublin Road, Columbus, Ohio. The press has a capacity of 100 tons and the maximum stroke of the ram is 18 in. It has a working pressure up to 2000 lb. per sq. in. The press is readily adaptable for various special operations by means

of the alteration of certain key parts. Either manual or electrical control is available. A separate control provides adjustment of the tonnage exerted by the press ram from 10 to 100 tons.

Angle Type Hydraulic Press

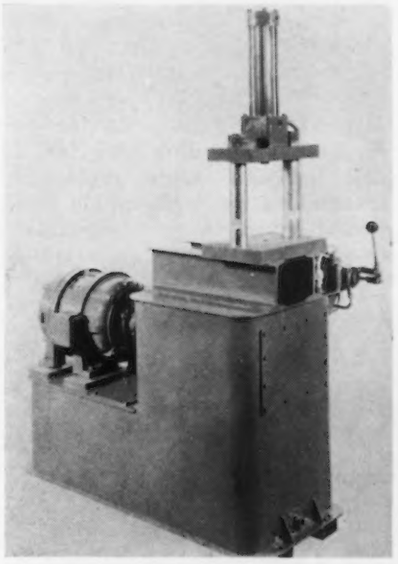
A 450-TON angle type hydraulic press has been developed for molding phenolic plastics according to an announcement by the *Lake Erie Engineering Corp.*, Buffalo, N. Y. Illustration shows a combination of vertical and horizontal operating units. The press is complete and ready for connection to accumulator pressure system. Platen measures 24 x 50 in. Vertical stroke is 12 in. and horizontal



stroke is 10 in. Main bed of press is of rugged design and cast in one piece to maintain correct vertical and horizontal alinement.

Arbor Press

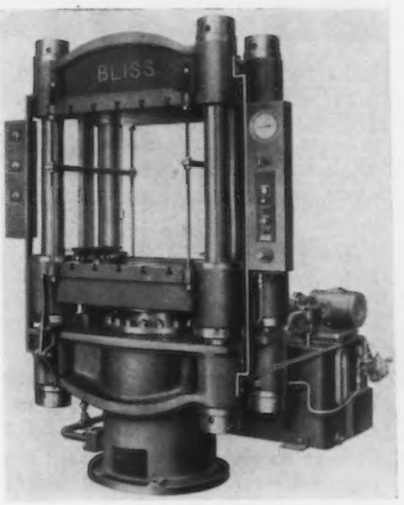
A NEW hydraulic arbor press, rated at 6 tons with an 8-in. maximum stroke is announced by *Hydraulic Machinery, Inc.*, 10421 Grand River, Detroit. The power unit and the press are one assembly, the former reinforced at the top by two I-beams, acting as the base for the assembly. Arbor press and power unit combined occupy a 27 x 42 in. floor space. The 5-hp. motor is directly connected to a standard



Vickers pump. Press is equipped with a directional, manually operated four-way valve that is self-centering, the gage registering from 0 to 2000 lb. pressure.

Molding Press

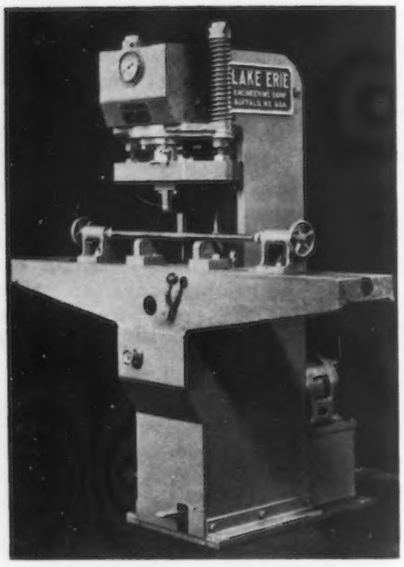
A 250-TON hydraulic press of the semi-automatic plastic molding type with a completely electrically timed cycle was recently built by the *E. W. Bliss Co.*, 53rd Street and 2nd Avenue, Brooklyn. The automatic timed cycle permits independent adjustment of the lengths of preliminary cure, gassing period and the final cure. A variation of this control affords independent timing of a chilling period if required and an independent timing of the flushing of the mold passages at the completion of the cycle. The ability to change from the quick advance speed to the press-



ing speed before contact insures entrance into the mold at a slow speed, and is particularly advantageous when working fine molding powders. Bliss guiding allows expansion of the heated platen but maintains accurate guiding of the platen on the rods of the press. Pressure is adjustable over at least a 10:1 range. The pumping unit can be placed some distance from the press or immediately behind the press and covered by a shield.

Shaft Straightening Press

A SENSITIVE quick-acting shaft straightening press complete with anvils and centers for testing is announced by the *Lake Erie Engineering Corp.*, Buffalo. Pumping unit is self-contained in base of press and provides 20-ton capacity. Ram operates at high speed and is arranged with quick return springs. Capacity is 20 tons. Combination hand lever and foot pedal control are so arranged that



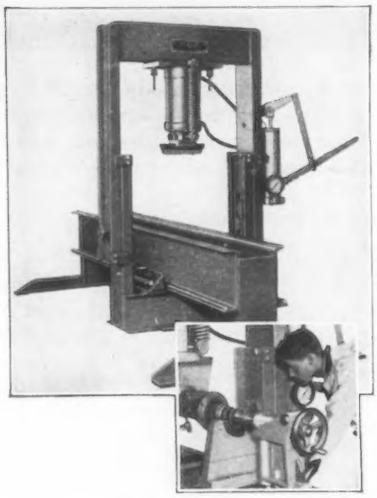
either may be used independently. Maximum down stroke of the ram is quickly adjusted by the control located on the yoke. Pressure control handwheel is conveniently mounted on the front of main pedestal. Main frame is built up of rolled steel side plates electrically welded.

Heavy Duty Hydraulic Pump

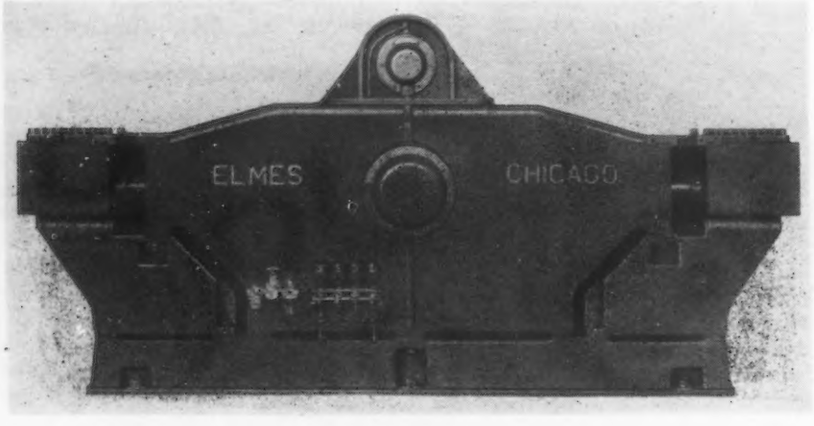
THE illustration shows a 6-plunger, fully enclosed, horizontal hydraulic pump, recently added to the line of the *Charles F. Elmes Engineering Works*, 1001 Fulton Street, Chicago. All moving parts are pressure lubricated and the connecting rods run in a continuous bath of oil. Roller bearings are used throughout. Maximum rating of the pump is 400 hp. Herringbone gears, running in a continuous bath of oil, are used for driving the pump, insuring long gear life. The compact arrangement of the pump is a space saver, and it is particularly adaptable for accumulator systems. The pump can be equipped with built-in by-pass valves or safety valves, as desired.

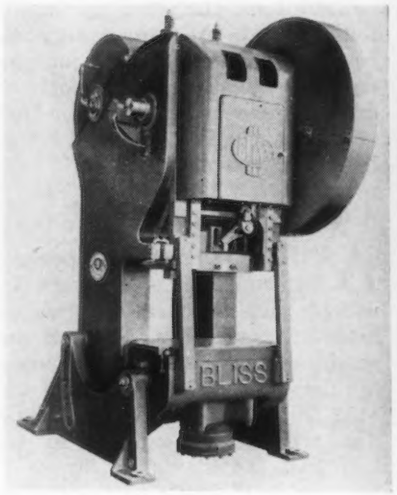
Shaft Straightening Tools

A SET of tools for straightening shafts or rear angle housings has been introduced by the *Bee-Line Co.*, Davenport, Iowa. The equipment consists of a pair of work-supporting center assemblies, two work-supporting fixtures, a flat and a round pressure tool and a set of half round spacers. A surface plate and a dial indicator are included for precision measuring. The tools will accommodate work up to



8 ft. long when used on a 10 ft. press bed. The height above the bed is sufficient to accommodate work having an enlarged portion 22 in. in diameter. It will handle flat surface work and rounds up to 6½ in. in diameter. The surface plate rests on the press bed and is used as a sliding base for the dial indicator while gaging the trueness of the work which is revolved on the centers to obtain a total run-out reading.



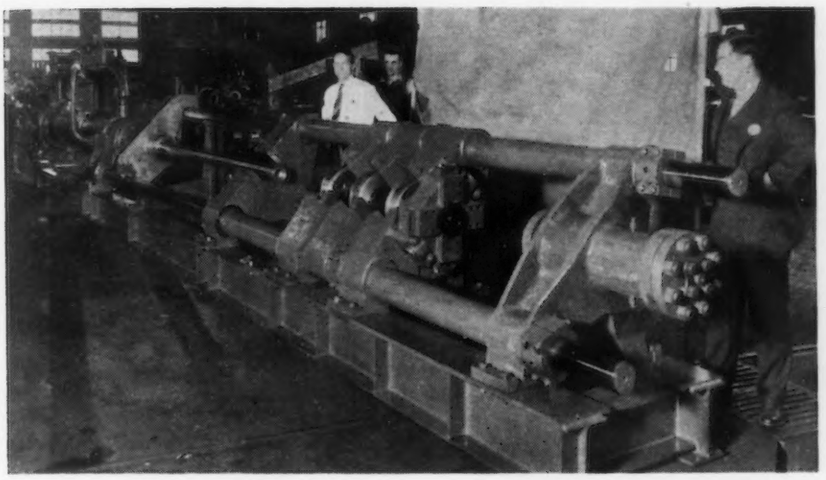


Inclinable Press

THE new Bliss - Consolidated No. 9 inclinable press, made by *E. W. Bliss Co.*, Brooklyn, is equipped with a Marquette pneumatic cushion. The press shown is of the geared type with the main working parts either enclosed within the housing of the press or in guards. It is driven by a 15-hp. motor mounted inside the frame. Heavy removable tie bars are used in front of the frame to keep deflection at a minimum. All heavily loaded parts are made of a special high strength alloy material. The press can be inclined 39 deg. Features of this design are the smooth-faced frame, the enclosed operating mechanism, together with a spring counter - balance for the slide mounted inside the frame. The press has an open-back gap frame allowing feeding strip stock either right to left or front to back. A new type lever and cam operated knock-out slide with single adjustment at the front of the press eliminates the necessity for setting correct knock-out position at the rear of the press.

76-Ton Draw Press

A 76-TON horizontal hydraulic double-acting draw press was recently completed by the Baldwin Southwark Division of the *Baldwin Locomotive Works*, Philadelphia, for shell forging production. It has a piston diameter of 14 in., piston rod diameter of 9½ in. and a stroke of 87 in. The press has two horizontal columns situated on a 45-deg. angle. With the extreme end of



the pistons supported by a well guided crosshead and adjustable shoes on the two columns, the drawing mandrel of the press is guided in a bronze-lined guide casting. It is equipped with three die heads and one stripper head. The extreme end of the press is provided with a bumper cylinder 6 in. in diameter with an 8-in. stroke.

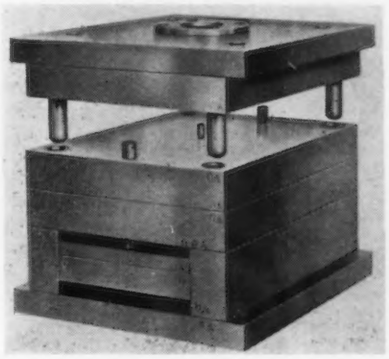
Press Type Interchangeable Stamp

SUITABLE for mounting in mechanical or hydraulic presses of all types, an interchangeable marking type holder is now available from New Method Steel Stamps, Inc., 145 Jos. Campau, Detroit. The wedge lock method of retaining the characters in the holder makes it possible for all characters to be held rigidly both sidewise and endwise by a single socket type set screw. The body of the holder is large and

substantial to assure equal pressure along its length for all character impressions. Shank sizes, while dependent upon specifications of the user, also are of relatively large diameters for maximum rigidity and service. The holder is available for type sizes ranging from 1/32 up to ¼ in. in various type faces. All characters are hardened and have the Newco bevel to reduce wear and provide freedom from chipping of the letter faces.

Standard Molding Dies

THE development of standard molding dies by *Detroit Mold Engineering Co.*, Detroit, introduces a new idea in preparing dies for injection molding of plastics. The D-M-E standards enable a molder to reduce his die preparation time to such an extent that he can advance the starting time of his

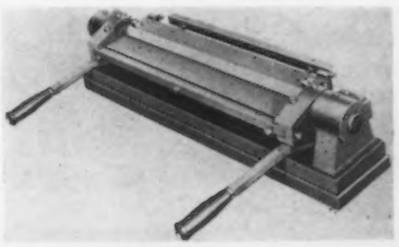


production at least a week. The sizes most generally used are carried in stock by the manufacturer. A master drawing in heavy line is supplied with each standard, thus saving time in laying out the die design and detailing, since this drawing carries all details of the D-M-E standard. Savings of material costs are also claimed. These standard dies are so simplified in design that most of the component parts can be utilized again in other build-ups. Because the design provides rigid support for the back-up plate through pillars, the likelihood of sagging or settling of cavities is eliminated. The leader pins are purposely placed in unsymmetrical arrangement to guard against the possibility of having the parts reversed when put together. All parts are jig-drilled for interchangeability.

Small Brake and Shear

THE No. 2 Di-Acro shear, made by *O'Neil-Irwin Mfg. Co.*, Minneapolis, is a rugged unit suitable for precision work on light and medium weight metals and materials that cannot otherwise be rapidly worked to accurate tolerances with a hand-operated "scissors" shear, or with a heavy foot operated floor-type shear. Maximum shearing capacity is 9 in. in 22 gage steel. Accurate squaring, slitting, stripping and notching to die accuracy (0.001 in.) is readily provided by adjustment of material guides, blade pitch and stops. All ductile and pliable metals and materials can be accurately worked, including spring tempered metals, plastics, leathers and rubber, frequently eliminating the need for blanking and forming dies. Power driven Di-Acro shears can be furnished as a complete unit with shear, countershaft and motor mounted on a rigid floor-type stand.

The new size Di-Acro No. 3 brake, illustrated, made by the same firm, has a maximum folding width of 18 in. Folding capacity is 24 gage steel or 18 gage steel up to 12 in. in width. Construction allows contact surfaces to be readily removed for changes or replacement. The folding plate is hardened and heat treated to resist wear. Complete adjustments of all contact surfaces are provided, allowing vertical and horizontal adjustment for accurately duplicating either obtuse or acute angles up to 110 deg. as permitted by the working radii.



Precision adjustable stops are provided for holding duplicated work to die tolerances. Forming work involving two or more different operations on a single part may frequently be worked in sequence with the ample folding surface offered by the No. 3 Di-Acro brake.

Small Tools

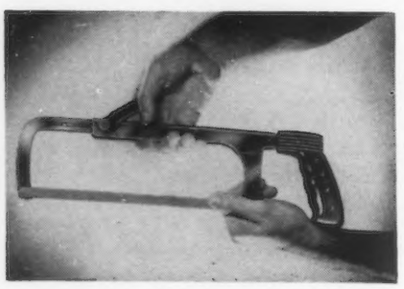
Abrasive Cloth Points

A NEW spirally wound abrasive cloth point called Spirapoint has been introduced by *Behr-Manning* (Division of Norton Co.), Troy, N. Y. These points are conically formed in a wide variety

of shapes for work on odd shaped surfaces, particularly those of varying radii and in hard-to-get-at places. This new item may be used for such operations as deburring, radiusing, cleaning, finishing and polishing on machined steel and alloy parts and on aluminum and magnesium parts in aircraft engine work. Spirapoints in grits No. 50 and finer are supplied with ⅛ in. hole to fit threaded mandrel with ¼ in. shank and ⅛ in. pilot. Grits Nos. 36 and 40 are supplied with 3/16 in. hole to fit threaded mandrel with ¼ in. shank and 3/16 in. pilot.

Hack Saw Frame

ALL loose blade studs and threaded tension devices have been completely eliminated in a new type of hack saw frame just introduced by *Victor Saw Works, Inc.*, Middletown, N. Y. Blades are released or set up by a simple cam-action lever-lock. This frame is made of heat treated spring steel with gun metal finish. It is available with either pistol grip (Victor No. 20) or straight handle (Victor No. 30). Both handles are made of Tenite, a non-conductor of electricity. Blade can be repositioned to face in any of four directions. To adjust length for either 8, 10 or 12 in. blades, operator merely pulls out pivot pin to open position, slides frame forearm in or out to desired length, and snaps pivot pin back into place.



Water-Hardening Tool Steel

FOR applications where extreme toughness is required above all other characteristics, the *Jessop Steel Co.*, Washington, Pa., is now furnishing a water-hardening tool steel under the brand name of Jessop RT. It is said to have unusual toughness and strength, and gives very good performance, especially for those applications classified as "battering tools." A tensile test on properly treated RT will show a

breaking strength of 323,000 lb. per sq. in. and elongation in 2 in. of 4.5 per cent. A 1½ in. piece will have a fine grained case approximately 3/16 to ¼ in. deep with hardness of about C-61/63 Rockwell. The illustration shows a wheel made of Jessop RT tool steel for heavy duty pipe cutter.

Torque Wrench

A NEW torque wrench, made by *Apco Mossberg Co.*, Attleboro, Mass., is made in four dial sizes: (1) a unit measuring 0-150 in.-lb. of tension on an outside scale, first revolution—up to 250 in.-lb. on an inside scale, second revolution; (2) calibration range 0-600 in.-lb.; (3) range 0-1200; (4) range 0-2400 in.-lb. With four sizes of dials and the calibration range of each limited, dial graduations are larger and

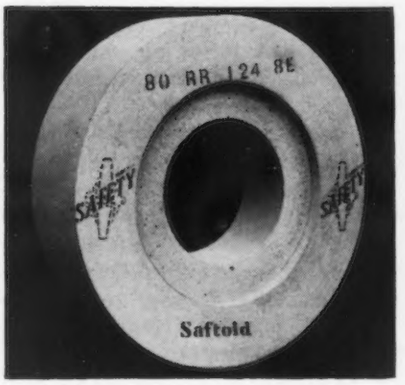
more widely spaced providing easy, more accurate readings. The dial is set in a special housing inside an extension of the handle. Operating accuracy is guaranteed to 98 per cent.

Double End Tool Grinder

A NEW double end grinder has been announced by *Willey's Carbide Tool Co.*, Detroit. Its design incorporates all recent improvements for the free hand grinding of tungsten, carbide tipped tools and other types of tool bits. It is furnished with coolant pump and pan for wet grinding. The motor is of special design, available for 220 or 440 volts, 60 cycle, three phase, 3450 r.p.m. The machined tool rest table is adjustable to all angles between 30 deg. towards or away from the wheel. Table is also adjustable, with quick clamping features to compensate for wheel wear.

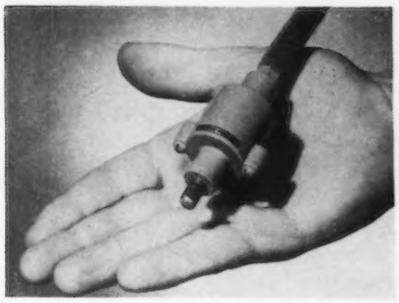
Regulating Wheels

SAFETY GRINDING WHEEL & MACHINE CO., Springfield, Ohio, has discovered a substitute for rubber in the manufacture of regulating wheels, which they have named Saftoid. These new feed wheels for centerless grinders cost less and last longer than the same wheels made of rubber, it is claimed.



Midget Air Clamp

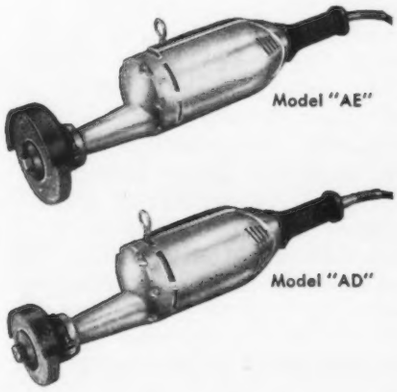
MEAD SPECIALTIES CO. of Chicago announce a new midget air clamp for assembly jigs and other multiple applications. All air clamps in any setup can be operated by a single master valve. The lock-up and release of assemblies is instantaneous. The air clamp delivers 80 lb. force on a line pressure of 100 lb. per sq. in. The



stroke of the ram is 5/8 in. An internal return spring withdraws the ram when air is exhausted from the cylinder by the control valve.

Portable Grinders

TWO new portable grinders have been added to the line of electric tools manufactured by *Skilsaw, Inc.*, Chicago. They are models AD and AE, 4 and 5 in. grinders respectively. Ball bearings mounted in steel inserts on armature and extreme ends of wheel spindle absorb thrust and eliminate vibration. Commutator and switch are fully enclosed for protection against dust. The Skilsaw model AD grinder is 22 in. long, weighs 15 lb. and operates at no-load speed of 4500 r.p.m., driving a grinding wheel 4 x 3/4 x 1/2 in. Model AE has a grinding wheel 5 x 3/4 x 1/2 in. and operates at 4200 r.p.m. It weighs 18 lb. and is 22 5/8 in. long.



Wooden Mallet

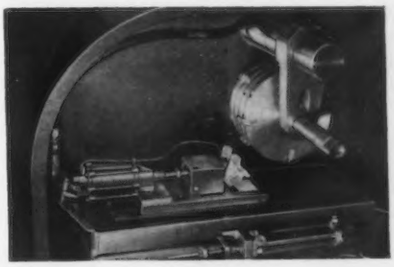
TORNADO Prestwood mallets, made by the *Breuer Electric Mfg. Co.*, 5100 N. Ravenswood Avenue, Chicago, are one answer to the problem of securing mallets of suitable hardness, texture, size, weight and durability for doing all types of driving, straightening and hammering jobs ordinarily done by soft metal hammers and mallets that come under the priority rating system. These mallets are said to be non-splintering and are refaceable. They are made in three sizes and weights.

Metal Cleaning Brushes

BRUSHES that look like disks with two square corners and rotate like a spinning coin are being produced by the *Osborn Mfg. Co.*, 5401 Hamilton Avenue, Cleveland, for service in industry to remove dust, scale, rubber, burrs, sharp corners, dirt and chips from metal holes, cavities and recesses. These Sibot brushes will clean both the bottoms and side walls in the cavities of various machined, stamped, cast and forged parts. The brushes may be used by hand, automatically or semi-automatically. They may be inserted into the chuck of an ordinary drill press. These brushes are made of wire in two ringlock sections with a metal shank in between.

Air Cylinder

SENACON is the trade name of a new line of air cylinders, made by *Smith-Johnson Corp.*, 623 E. 12th Street, Los Angeles, complete with universal integral valves, for use wherever powerful reciprocating motion is required. These cylinders save time in opening and closing vises and holding fixtures, operating clutches and latches, and similar operations. Another function of the motors is as prime movers for supplying fractional horsepower for such operations as



tube flaring, punching, broaching, stamping, die casting and bushing insertion. A special feature is the dual exhaust ports that provide for selective utilization of the exhaust air blasts for ejecting work pieces, cleaning out chips, and permitting adjustment of speed of one or both strokes. These motors are available with strokes of 1 1/2, 2 1/2, 6 and 9 in.

Work Clamp

A CLAMP with a U-shaped toggle bar, with the handle-in-line, is announced by *Knu-Vise, Inc.*, Detroit. This new clamp permits the simultaneous clamping of small parts regardless of their thickness. The slotted toggle bar allows free horizontal movement of the two rubber-capped spindles for

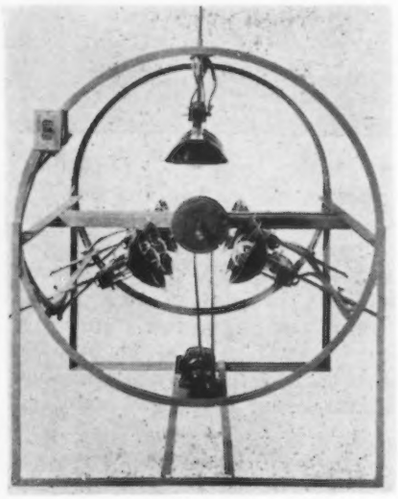
their positioning over work. Once adjusted for the job, these spindles remain in their respective fixed positions until the work is completed. Repeated clampings exert the same degree of pressure. A simple flip of the handle is all that is required to either clamp or release work. The company has also developed several other types of work clamps.

Finishing

° ° °

Infra-Red Wheel Dryer

PARK CHEMICAL CO., 8074-8110 Military Avenue, Detroit, has developed a portable infra-red ray machine, which dries polishing wheels 30 min. after application of "head." Wheels pass three lamps in each revolution. Lamps are adjustable to any distance from the



wheels, and various diameter wheels can be mounted on the drying shaft by the use of special bushings. Working speed of the shaft is approximately 12 r.p.m. and it can be regulated to give other speeds. The unit is 54 in. square and 66 in. high.

Anodic Degreasing Material

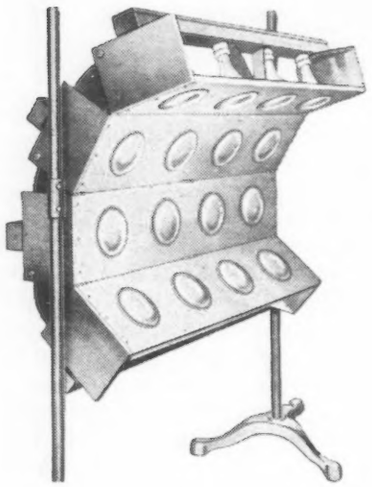
A NEWLY developed alkaline-type material, for anodic degreasing or reverse current cleaning of cold rolled steel parts before finishing, has been announced by *Oakite Products, Inc.*, 30H Thames Street, New York. Known as Oakite composition No. 90, this material has high conductivity and is readily adaptable to hard water conditions. It is said to remove oil, grease, smut, polishing and buffing compounds on the consistently thorough, speedy basis required where a large volume of work is handled.

Brass and Copper Cleaner

TWO formulas for brass and copper cleaners have been developed for use in still tanks, washing machines and agitated tanks by *Nielco Laboratories*, 19720 Florence Road, Detroit. At a concentration of 4 oz. per gal. at a temperature of 212 deg. F., this product removed SAE 50 lubricating oil in 1 min. and 32 sec. The surface of the cleaned panels rinsed freely with cold water, leaving no film of any kind.

Infra-Red Drying Tunnel

A NEW infra-red drying tunnel has been introduced by the *Wil-Son Mfg. Corp.*, 154 West Erie Street, Chicago. This tunnel uses the General Electric R-40 combination reflector lamp for high operating efficiency. The construction of this tunnel makes it possible to change the entire shape within 3



min. These tunnels are designed so that additional rows can be added to the tunnel sections, and tunnel sections can be joined end to end for increased tunnel lengths.

Oil Cleaner for Steel

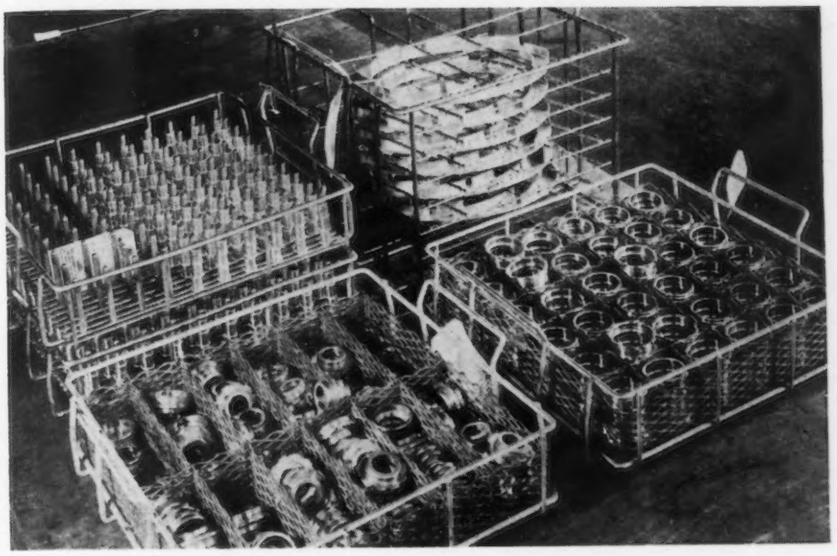
ANNOUNCEMENT is made by the Chemical Development Laboratory of the *Curran Corp.*, Malden, Mass., of a light "Polar K" oil which is claimed to remove perspiration, water, oil and dirt from steel surfaces. The new oil displaces and absorbs water and leaves a thin film of lubricant and rust preventive. It is said to be especially applicable for protecting the water side of steam turbines, water pumps and meters during storage and steel parts which may have been exposed to rain, immersion in sea water or damp storage. The fluid neutralizes the salty acid touch of fingers. The oil is soluble in hydrocarbon and lubricating oils and no subsequent cleaning procedure is necessary to remove the thin, protective lubricant.

Metal Coating

RESI FLEX is the name given to a synthetic resin base type coating made by *David C. Brown Co.*, 17532 Wisconsin Avenue, Detroit. Of low viscosity, the coating will not gum equipment. It is waterproof, oilproof and impervious to mineral acids, alcohols and gasolines. It is furnished in water clear solution only and may be applied by dipping, brushing or spraying over any clean and dry surface. Baking time runs 6 to 30 min. at 275 to 300 deg. F., depending upon the size of the unit and type of material. It can also be adapted for the preserving of photographs, blueprints and tracings.

Rust-Inhibiting Wax Coatings

UNLIKE oils or greases, the rust-inhibiting wax coatings, made by *S. C. Johnson & Son, Inc.*, Racine, Wis., produce a protective finish that is completely dry to the touch. The wax hardens quickly upon application, and being dry, it is not soaked away by contact with absorbent materials. The coatings are applied by dip or spray methods. The finishes do not require dilution and are applied at room temperature without heating. To accelerate drying time, a current of warm air may be passed over the finished articles, or they may be dried under infra-red lamps.



Degreasing Basket Coating

A NEW coating for wire transporting and degreasing baskets is now being made by *Resistoflex Corp.*, Belleville, N. J. The new coating is a modified polyvinyl alcohol resin in solution form. Wire baskets can be coated right in the shop by first dipping and then passing through a drying oven. The solution dries to a resilient, solvent proof, abrasion-resistant coating that will not tarnish or otherwise injure highly finished metal engine parts. The same solution is also used to coat workers' shoes that are constantly exposed to cutting oils and solvents injurious to leather.

Tack Rag

A NEW professional tack rag, the O-U-Tack, which eliminates the use of solvents and saves time in cleaning dust and overspray prior to painting, has been announced by the *Robinson Specialty Mfg. Co.*, 816 West Fifth Street, Los Angeles. It is flexible as to tackiness and does not dry out in storage. If the user desires more tackiness, a small amount of heat can be applied; if less tackiness is desired, the rag may be hung in the open air. O-U-Tack is said to be particularly applicable when preparing aircraft skins for synthetic enamel as it completely removes metal dust and other minute particles developed in riveting and drilling. A safety feature is its immuneness to spontaneous ignition.

Degreasing Solvent

FERROUS and nonferrous metals as well as other materials respond to the speed cleansing action of a high speed solvent cleaning cyclodiene hydrocarbon nonaequeous degreasing solvent announced by Technical Processes Division of *Colonial Alloys Co.*, Philadelphia. The work is dipped into the solvent, at room temperature and comes out thoroughly degreased. A rust inhibitive thin protective film remains on the work for about 20 min., before complete evaporation. Open, wood or steel tanks can be used as containers, as well as standard degreasing machines. Re-distillation yields not less than 90 per cent recovery at 375 to 410 deg. F.

Camouflage Paint

INFRAY is the name of a new infra-red-reflecting, heat-reflecting paint developed by the *Arco Co.*, Cleveland, for camouflaging industrial plants. Arco Infray is lustreless and may be brushed or sprayed. If too heavy, it may be thinned with naphtha or mineral spirits. It dries to touch in about 2 hr. and may be recoated, if necessary, after an overnight dry. Infray may be applied over asphalt, tar or any other ordinary roof coating. With this paint it is practical to paint with dark, low-visibility colors and achieve protective concealment from the air without sacrifice of plant efficiency. Colors include grass green, sand, loam black, olive drab, sage, conifer, and dusk.

One-Coat Paint

A NEW paint product that primes, seals and finishes on any interior surface in one coat has been announced by *American-Marietta Co.*, 43 East Ohio Street, Chicago. Designated Valdura Singlekote, it may be applied to surfaces previously coated with calcimine or casein paints, providing the old covering is bonded, or tight to the wall. It sets within two hours, dries within 12 and provides a dead-flat finish when viewed at a 90-deg. angle. Interior surfaces that may be covered are plastered, concrete, brick, wallboard, wood, wallpaper and metal. Coverage is up to 750 sq. ft. per gal. It is available in white, but may be tinted with alkali-resistant colors in oil.

Coated Metal Substitute

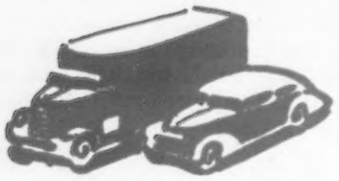
A NEW sheet metal substitute for galvanized iron and sheet copper known as Cheney protected metal, has been announced by *Cheney Metal Products Co.*, 33 Oxford Street, Trenton, N. J. It conforms to Army, Navy and other government department specifications. In sheet form, it can be sheared, bent in a hand brake, bent on dies, and run through a lock forming machine. It contains neither coal tar nor asphalt and the finished coating is claimed to be a very tough, elastic, rubber-like material which will not run at 230 deg. F. or crack at freezing temperatures.

Chemical Resistant Enamel

HILO CHEMICAL resistant enamel, made by the *Hilo Varnish Corp.*, 42 Stewart Avenue, Brooklyn, is intended for protecting surfaces which may come in contact with water, dilute acid and dilute alkali. It is furnished in light gray or black, both of which stand up well on exterior exposure. This enamel may be sprayed by reducing three parts enamel to one part of solvent. It will set to touch in 15 min., will dry to handle in 1 hr. and to recoat in 24 hr. Other products made by this firm are five black Rip-pls which are synthetic products that give uniform fine line effect. They produce flexible and wear-resisting coatings which have good outdoor durability and resistance to water, gasoline, and salt-spray. They are non-skinning.

Assembly Line . . .

• G-M calls 250 men to school for mastering CMP . . . Employees from GMAC take course in material and priorities problems . . . Corporation now has 16 schools operating for war work instruction.



DETROIT—General Motors Corp. is insuring itself as much as possible against confusion within its organization resulting from unfamiliarity with the Controlled Materials Plan. Not content with having its purchasing agents and others concerned with priorities and deliveries attend federally-sponsored seminars around the country, the corporation undertook a broad course of instruction of its own during December.

Approximately 250 purchasing agents and others met in Detroit for a two-day discussion of CMP, what it means, how it is applied, and how its problems can be met. The subject was introduced by means of the slide film used by WPB to outline the program at regional meetings throughout the country. There followed discussions led by B. D. Kunkle, vice president in charge of the manufacturing staff. Questions came up from the floor and were answered when possible. Problems whose answers could not be determined were sent on to Washington for clarification. As the rulings come back, they will be broadsided to all those concerned within General Motors. This group, quite naturally, will also receive any printed matter on CMP prepared by WPB.

GENERAL MOTORS, meanwhile, has trained a sort of "second echelon" of men to go to work on priorities, ordering and CMP affairs. This small group consists of certain men formerly active in GMAC and GEIC, the corporation's credit and insurance affiliates, whose jobs were reduced during the national transition to a war economy. The men were taken to Flint for a two-week course on materials and priorities problems held at the General Motors institute. Now their new knowledge is being utilized through the various divisions.

In addition specialized training on CMP is in progress in Detroit area. Last week at the Ford rotunda close to 300 men representing approximately 25 industrial companies of the area gathered for a detailed study of CMP, led by J. E. Wilson, deputy regional director for WPB.

The plan was presented and analyzed from the standpoints of those attending—mainly production executives and key purchasers. This meeting was the first of a series to be held throughout Detroit and Michigan.

GENERAL MOTORS, as might be gathered from its training program on CMP, is definitely instruction-minded in any of the problems it encounters. A bright and shining example of this attitude can be found in its program for training of soldiers for maintenance work on military equipment in the field. A huge program is spread through many plants in the central midwest.

The corporation now has 16 such schools operating. A year from now that number will quite likely be doubled. This year has seen some 13,000 non-commissioned men "graduated"—after training courses running in length from 10 days to 11 weeks. In 1943 this number will be augmented to around 40,000.

This work in such factory-operated schools, incidentally, has a multiplying aspect for approximately one-fourth of the soldier graduates are qualified instructors at the completion of their courses.

THIS work is being done by General Motors in conjunction with the military training division of the Army Ordnance department, and with other military bodies. The company has allocated $5,000,000 a year for such work, but much of the money will come back to it in repayment by the army for man-hours of training and for facilities.

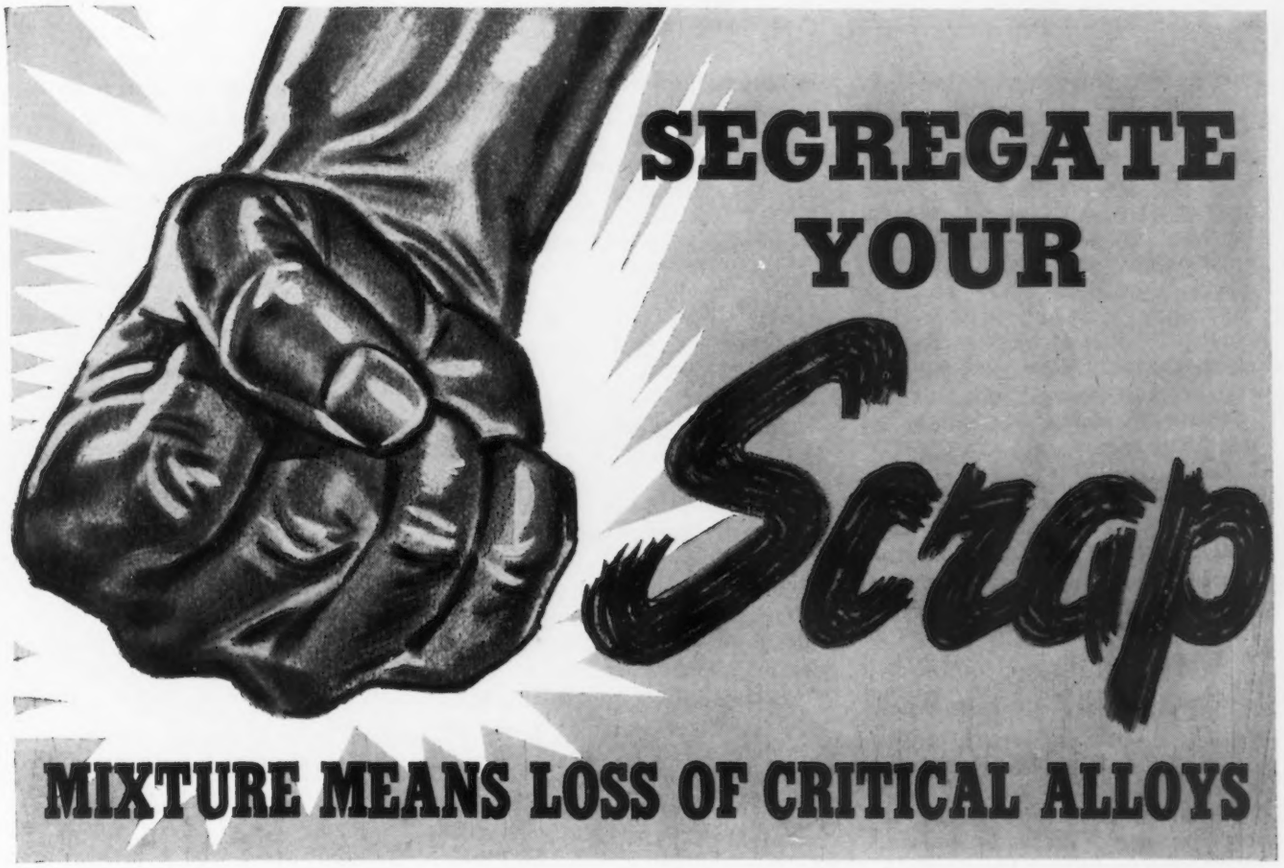
There are some most interesting post-war ramifications of this program. Men graduating from these courses will have considerably better than a working knowledge of mechanics, electrical installations and other such spheres. The war will spawn hundreds of thousands of men capable of taking immediate places in shops or garages, for the work of General Motors is being duplicated on a smaller scale in large numbers of the plants producing armament.

AN additional post-war phase of this training program is the advance which is being realized in instruction methodology. It has been found that under the enforced hothouse speed of the course, most effective aid is developed by use of such visual aids as slide films, chart series, and other means. At Allison, for example, a gear section is demonstrated in a lucite model, through whose transparency the workings of the entire train of gears are visible. There are slide films and motion picture films. Cutaway models are provided for significant parts. The instruction and "tip" manuals are detailed and complete.

Little else has been spared to make the soldier training schools thorough and complete. Installations at some of them can be reckoned to cost hundreds of thousands of dollars. This is particularly true in the aircraft engine training schools, where working models of motors may be numbered by the score — at $9,000 and upwards apiece—and where facilities for teardown and reassembly of these units, together with concurrent instruction, cost additional thousands.

THE General Motors training job spreads over eight branches of the services—the Army, Navy, Air Force, Coast Guard, Marines, Corps of Engineers, Armored Force, and Tank Destroyers.

At the Olds plant in Lansing, Mich., is the most elaborate gun school maintained by the corporation. Here an enrollment of about 450 men is instructed in field care of 20 mm., 37 mm., and .50 caliber rapid fire weapons for ground, aircraft, naval and anti-aircraft installations. Since the establishment of this school last Feb. 9 more than 1,900 men have been trained in it; the current instruction pace is such that the men go to school on day and night shifts. There are 50 in-



SCRAP salvage is a vital factor in the war effort, and to be fully effective such a program must include methods for segregating and conserving critical alloying elements so urgently needed in the construction of war materials.

Ferrous and non-ferrous metal scrap should be collected in separate containers at the machine where they are generated. Each class of high-speed tool steel and each type of constructional alloy steel should likewise be kept separate so that the alloy content may be returned to service.

Remember,—alloy scrap which is segregated, classified and labeled according to type and composition is a vitally important commodity today—and urgently needed to augment primary supply of nickel, molybdenum, tungsten, etc.

The metallurgical experience of our technical staff is available to aid you in these and other phases of conservation.

KEEP SCRAP MOVING INTO WAR PRODUCTION!

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

structors at this school mainly former Olds field service men. This school is said to be the largest detached institution administered by the Ordnance school, whose headquarters are at Aberdeen Proving Grounds, Md. In this school are numbers of lecture and work rooms, where knowledge of the gun and rapid teardown and buildup are taught. Equipment includes a complete fighting plane, as well as fuselage and wing sections, to demonstrate mounting, as well as a test firing range.

Before a student graduates from this course he must disassemble and reassemble both the 20 mm. and .50 caliber guns blindfolded—to prove his familiarity with the parts under conditions of total darkness which might prevail in a battle area.

IT is interesting to observe how this school, like many of the others, has its roots buried in civilian practice. During peacetime Olds trained the 15,000 mechanics required for its 3,600 dealerships, both at the factory and in the field. When the war came and the need arose for instruction on gun maintenance, the field service men were trained in the new procedures and could immediately turn their teaching talents to the advancement of the arms effort.

One of the largest schools, from standpoint of graduation pace, is that of the Pratt & Whitney aircraft engine school operated by Chevrolet at Detroit, now reaching toward "capacity." In this instance, "capacity" means about 300 students enrolled for three-week periods. Soldiers coming to this school have behind them 144 days of general maintenance training, and are prepared at Detroit for second and third echelon work — immediately behind the advanced forces in the field, and at semi-permanent bases in the rear. They are taught to disassemble their engines, inspect parts and detect flaws, and repair carburetion and ignition troubles. They are also familiarized with propeller assembly problems.

THERE are 33 instructors drawn from Chevrolet's service organization. They prepared for the present assignments with three months of intensive training at the P&W School at East Hartford, Conn., or at Chevrolet's own school in the case, where such engines are produced.

At the Buick aircraft engine school in Flint a streamlined course has been developed which transforms raw recruits into experienced overhaul mechanics during 11 weeks of training. Groups of about 59 enter the school weekly, making an enrollment of over 500 at all times. They proceed down a series of shops, in each of which one phase of aircraft engine maintenance is studied. During their eleventh week of training they work on "live" motors — engines which function in installations simulating those of actual aircraft.

APPROXIMATELY 80 per cent of the course is devoted to shop work while the remainder consists of lecture courses.

The soldiers organize into a fairly complete military encampment, including a color guard, a band—even a glee club. To date more than 800 soldier-mechanics have graduated.

WELDING ROD SAVER: This unique welding rod holder adapter makes it possible to use welding rods right down to the last inch according to its originator, Raymond Baugh, welding technician of the Cadillac Motor Car Co. The adapter is gripped in the regular holder and the rod is lightly fused to the adapter by its end making nearly the entire rod usable.

General Motors institute at Flint, with 24 years of experience in industrial training behind it, has around 75 soldier-students enrolled in a diesel engine three-week course, with graduations weekly. To date about 600 ordnance department men have been trained in this manner.

Laboratory work in this one section consists of disassembly and preassembly of engines, study of subassemblies and actual work in tank hulls.

A second division of work at this school consists of teaching of ordnance men who will maintain power trains for combat vehicles. Each class lasts five weeks and graduates scores of army ordnance mechanics or instructors.

A third school is maintained for ordnance armor plant welders, turning out about 10 men every two weeks.

NEWLY installed is a five-week course conducted for the Navy to train men on various types of marine diesel engine installations.

The largest and most diversified General Motors training operation is at the Allison division, in Indianapolis. A one-time paper mill serves as headquarters for approximately 75 instructor-workers there and in the field. This group has trained more than 15,000 men to date, civilians and soldiers together of which two-thirds were instructed in the field.

The broad objective of this school is to develop mechanic-instructors rather than mechanics, so that the servicing of Allison engines can be taught as necessary in United Nations bases throughout the world. In consequence, this school has trained not only soldiers of army air force contingents, but others from Canada, New Zealand, Britain and China, representing the air forces of their respective countries.

Climaxing the training period at Allison is study in maintenance of engines in the field—how to start them and stop them properly and service them in their installations. Toward this end, discarded sections of the aircraft in which Allison engines are installed have been rebuilt into complete fuselages in one section of the school. Anchored to the ground, they simulate actual conditions of field maintenance.

Bushings, Inc., Formed to Make Rubberflex Bushings

Detroit

• • • **A new organization,** Bushings, Inc., Berkely, Mich., headed by B. C. Doying of Detroit, has been set up as a licensee of Silentbloc Inc., holder of patents on rubber insulated bushings, now widely used in combat vehicles. The original Silentbloc company was founded in Belgium by Leon Thiry, the inventor, and now a resident of this country. R. G. Bradley, who was general sales manager for Harris Products Co., formerly of Detroit, and maker of conventional rubber lined bushings, will direct sales and engineering of Bushings, Inc., while F. L. Hess, formerly in charge of purchasing at the old concern, is treasurer of Bushings, Inc., and also directs purchasing.

Up until now these Rubberflex thin walled rubber bushings had been manufactured in the United States by a limited number of companies, chiefly automotive, and for a single application. The new line of bushings is being made available for general distribution in a wide range of sizes. They employ a thinner layer of live rubber between the metal sleeves than commonly used and are made by "shooting" the previously molded oversize rubber bushing between an inner and outer metallic member. The bond between the rubber and the metal is mechanical. Such insulated bushings are capable of absorbing vibration and shock and of taking torsional and radial movement of a limited extent without lubrication. The new bushings are said to save from 60 to 80 per cent of the rubber formerly required in one important application. The bushings are currently being employed as insulating backing for ball, needle, babbitt, bronze and powder bearings. The rubber absorbs shock and allows misalinement.

Eastern Aircraft First Auto Unit to Build Complete Planes

• • • **The Eastern Aircraft** Division of General Motors Corp. has become the first unit in the automobile industry to convert to complete airplane production. L. C. Goad, general manager, reports that five plants which were manufacturing automotive parts or assembling automobiles less than a year ago are now in production of fighter planes and torpedo bombers for the United States Navy.

Although only 11 months old, Eastern Aircraft has retooled the five General Motors automotive plants the new division absorbed upon its formation on Jan. 21 of this year and is now well embarked on the production of two different planes for the Navy, both designed by the Grumman Aircraft Engineering Corp., Mr. Goad reported in his first public statement on the new division's activities.

In fact, about a half year after the letter of intent was received from the Navy, Eastern Aircraft, from parts furnished by Grumman, had assembled and flown its first airplane. Now Eastern Aircraft is manufacturing its own parts for assembly into the completed planes. The Eastern Aircraft conversion was described as one of the most difficult undertaken by the automobile industry in its shift to war production.

Defense Plant Corp. Approves 8 More Contracts

Washington

• • • **Defense Plant Corp.,** RFC subsidiary, has authorized the following contracts:

General Motors Corp., Detroit, to provide additional facilities in Indiana and Michigan at a cost in excess of $2,000,000, making a total commitment of more than $63,000,000.

Boeing Aircraft Co., Seattle, to provide additional facilities in Washington at a cost in excess of $1,800,000, making a total commitment of more than $18,000,000.

Walter Kidde & Co., Inc., New York, to provide additional facilities at a plant in New Jersey, making a total commitment of more than $5,000,000.

Joshua Hendy Iron Works, Sunnyvale, Calif., to provide additional facilities in a plant in California at a cost in excess of $300,000, making a total commitment of more than $3,500,000.

General Motors Corp., Detroit, to provide additional equipment in a plant in Michigan at a cost in excess of $1,200,000.

Bell & Howell Co., Chicago, to provide plant facilities in Illinois at a cost in excess of $500,000.

Coast Carbons, Inc., Tacoma, Wash., to provide additional facilities in Washington at a cost in excess of $200,000.

General Electric Co., Schenectady, N. Y., to provide equipment for a plant in Connecticut.

Pullman-Standard Expands Aircraft Plant Facilities

Chicago

• • • **Pullman-Standard Car Mfg.** Co. is planning to expand its plant facilities because of new war contracts for wings and tail assemblies for two and four-motored cargo planes, according to H. V. Hughes, assistant works manager. War contracts now held by the plant total 14 times the company's initial orders, he reported.

The company's aircraft production is housed in a large freight car plant. Conversion of additional bays is now being completed and work is starting on the adaption of facilities in additional buildings.

Western Leg of "Big Inch" Laid, Eastern Leg Started

• • • **Less than 50 miles** of mainline pipe remain to be laid on the Texas-Illinois leg of the 24-inch war emergency pipeline, Harold L. Ickes, Petroleum Administrator, announced.

One of the seven construction crews lost six working days and another lost four during the last full work week in November, due to heavy rains and impassable right-of-way conditions along the northern sections of the pipeline, Mr. Ickes said, but satisfactory progress was maintained elsewhere to bring the total of "big inch" pipe in the ground to 473.63 miles.

Two other construction crews are already moving equipment to working sites along the 857-mile "big-inch" extension to the East—from Norris City, Ill., to the New York-Philadelphia refining areas.

The construction of pump stations and terminal facilities is also progressing rapidly.

WPB Estimates 1943 Concrete Bar Tonnage

Washington

• • • **WPB Steel Division** estimates of 40,000 to 50,000 tons monthly of concrete reinforcing steel bars during 1943 will be made. Reflecting a sharp drop this estimate compares with a monthly average of 150,000 tons in 1942. Peak production during the current year was from 175,000 to 185,000 tons a month.

Washington . . .

• Army-Navy Munitions Board, little understood, plays important role in harmonizing procurement of munitions and supplies . . . Has grown from skeleton force to large organization, housed with WPB.

WASHINGTON—one of the war agencies about whose functions there is little understanding is the Army and Navy Munitions Board. ANMB was organized in 1922 for the purpose of harmonizing the plans of the Army and Navy with regard to the procurement of munitions and supplies for war purposes. By the provisions of executive action dated Jan. 16, ANMB reports to the President through the Chairman of the WPB.

Although a skeleton organization prior to the outbreak of war, ANMB has greatly increased in size in the past year. ANMB is now housed in the same buildings as WPB and cooperates with that agency to provide the military viewpoint and coordination and advocation of Army and Navy interests.

ALTHOUGH it is a function of the military command to decide which articles and materials come first for strategic purposes, ANMB in conjunction with WPB implements and interprets those decisions in the industrial and commercial field. The board does not regard itself as a separate agency but as a projection of the War and Navy Departments. The board organization bears this idea out because its staff functions are actually performed by the personnel of those departments.

Undersecretary of the Navy James V. Forrestal; Undersecretary of War Robert P. Patterson and Auguste Richard, formerly vice-president of the Pacific Mills, who is chairman, make up the board. Mr. Richard is also chairman of the board's executive body, the Executive Committee.

The members of the Executive Committee are as follows: Brig. Gen. Theron D. Weaver, Director, Resources Division, Headquarters, Services of Supply, Army; Rear Admiral T. J. Keleher, Director, Resources Division, Office of Procurement and Material, Navy; Brig. Gen. B. E. Meyers, Army Air Forces; Rear Admiral S. M. Kraus, Navy Bureau of Aeronautics; Col. F. W. Rockwell, representing the Maritime Commission.

THE Secretaries of the Board are: Col. F. T. Norcross, Corps of Engineers, Army, and Capt. L. B. Scott, Navy. Certain other officers are specially designated by the War and Navy Departments as liaison agents for the purpose of keeping the board advised as to strategic requirements pertaining to procurement.

The board is assisted by four joint groups of Army and Navy personnel. These groups are directed by branch chiefs of the two Resources Divisions of the Army and Navy acting jointly.

These officers are:

Clearance Branches: Lt. Col. C. D. Barre, Army; Lt. Comdr. J. B. Shipman, Navy.

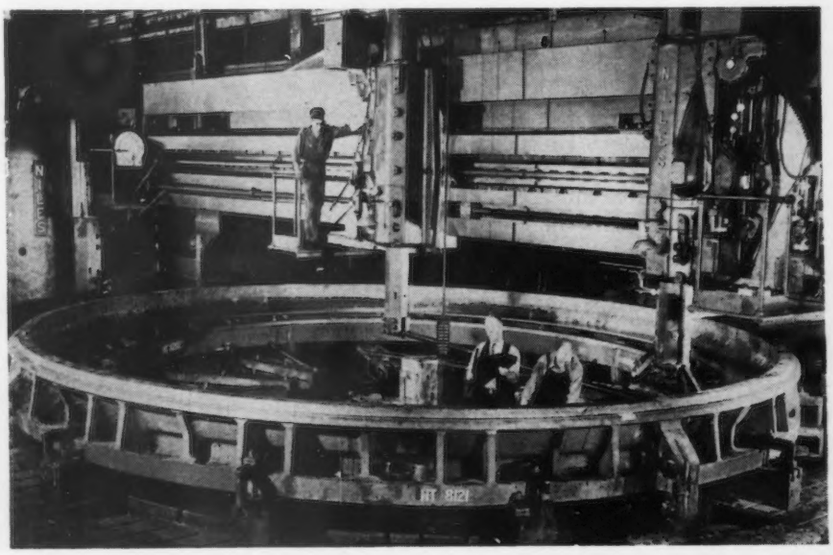
Priorities and Allocations Branches: Col. Frank R. Denton, Army; Comdr. J. C. Ten Eyck, Navy.

Products Branches: Col. Hugh A. Murrill, Army; Capt. E. P. Henning, Navy.

Materials Branches: Col. Clifford V. Morgan, Army; Lt. Comdr. E. H. Augustus, Navy.

THE Material and Product Branch officers are assigned to the various WPB Industry Divisions, including the Controlled Material Divisions. Duties of Army and Navy officers in the various WPB divisions are to coordinate and support the interests of the armed services in the work being done. This means that WPB has available the assistance of the military in every undertaking proposed, so that authentic information in the possession of the Army and

BIG GUN MOUNT: This huge metal ring is the base for a big gun mount which is being machined on one of the few boring mills in the country big enough to do the job. It is in the East Pittsburgh plant of Westinghouse Electric & Mfg. Co. The ring weighs 92 tons and is shipped in four sections.



WAR PRODUCTION- 33½ HOURS PER DAY!

SUNOCO EMULSIFYING CUTTING OIL

increased output 40%...stepped up tool life...improved finish

It takes bullets to win battles, and American ingenuity is finding ways to set amazing records in the race for arms production.

For example, in a plant turning out bullet-assembling machines, excess heat on tools and work, poor finish, and operators' skin complaints were restricting production. A Sun Oil Engineer — one of those capable Doctors of Industry — was called in to improve conditions. He recommended a change in cutting fluid . . . to Sunoco Emulsifying Cutting Oil. Now they're using Sunoco . . . and rate of production has increased 40% — equivalent to an extra 9½ hour shift every day! Finish has also improved, and skin trouble vanished.

Sun Doctors of Industry and Sunoco Emulsifying Cutting Oil stand ready . . . willing . . . and able to help you step up production in your shop. For helpful case histories of what they have accomplished for other leaders in the metal working industry, write for your free copy of "Helping Industry Help America."

SUN OIL COMPANY • Philadelphia

Sun Oil Company, Ltd., Toronto

LET'S GO! U.S.A. KEEP 'EM FLYING!

SUNOCO

SUN PETROLEUM PRODUCTS HELPING INDUSTRY HELP AMERICA

Navy can be brought to bear without delay upon all problems involving the supply of materials.

The Clearance Group obtains the opinion of all procurement services and bureaus on proposed conservation and limitation orders and submits reports embodying these opinions to the WPB Clearance Committee for appropriate consideration in passing on such orders before issuance. The Clearance Group also passes on between 500 to 600 appeals monthly from conservation and limitation orders which affect service contracts. After the Clearance Group arrives at a determination, the findings are referred to the WPB Appeals Division which has final jurisdiction.

THE procurement services and agencies which make recommendations on proposed conservation and limitation orders include the following:

Army — Medical Department, Ordnance Department, Air Forces, Quartermaster Corps, Transportation Corps, Chemical Warfare Service, Coast Artillery Corps, Engineer Corps, decentralized to procurement districts, arsenals and depots.

Navy Bureaus—Supplies and Accounts, Ordnance, Ships, Medicine and Surgery, Aeronautics, Personnel, Yards and Docks, and Headquarters, United States Marine Corps and Headquarters, United States Coast Guard.

Maritime Commission.

War Shipping Administration.

The priorities and allocations group develops policies concerning military priorities relating to the distribution of materials and products. If it happens that a preference rating proves inadequate to get the item for which it was assigned, investigation is made and recommendations for appropriate relief are made to WPB.

Requests for emergency ratings are handled promptly by the priorities and allocations group in conjunction with a parallel unit in the WPB. Typical exigency for emergency ratings (AAA or Allocations) are battle damaged ships.

Jeep, Peep Joined by Tweep

• • • **First there** was the "Jeep," and then came its offspring, the "Peep." Now the third generation has arrived in the person of the "Tweep." "Tweep" is the Army Air Forces' name for a three wheeled whatchamacallit, steered with handlebars and having a compartment for spare parts and equipment.

THE BULL OF THE WOODS — BY J. R. WILLIAMS

TH' PAPER IS FULL O' JOBS-- DIE SINKERS, METAL PATTERN, TOOL ROOM, DRAFTSMEN... BOY, YOU CAN GIT A JOB ANY PLACE!
HE'S LEARNED TO PUT A NUT ON A BOLT, AN' YOU NOTICE HE'S READIN' NOTHIN' BUT SKILLED HELP NOW!
THESE KIDS TO-DAY ARE SKILLED-- HE'LL LEAVE THAT PAPER SO TH' BOSS WILL THINK HE'S LOOKIN' UP ANOTHER JOB AN' HE'LL GET A RAISE!
SKILL
J.R.WILLIAMS

Cited for Award

• • • **The following** plants have recently been selected by the War and Navy Departments to receive the joint Army-Navy "E" production award:

Aliquippa Plant, Jones & Laughlin Steel Corp., Aliquippa, Pa.
American Optical Co., Southbridge, Mass.
Almond Street Plant, DeRossi & Son Co., Vineland, N. J.
Andover-Kent Aviation Corp., Middletown, Conn.
Army Map Service, Washington.
Athens Steel Co., Clifton, N. J.
Bantam Bearings Corp., South Bend, Ind. (two stars).
Barrett & Hilp, Mare Island Navy Yard.
Bedminister Plant, William F. Fretz & Son, Bedminster, Pa.
Ben C. Gerwick, Inc., Oakland Quartermaster Depot Wharf Project, Oakland, Cal.
Chromium Corp. of America, Waterbury, Conn.
Convenience, Inc., Plants 1 and 2, Greenville, S. C.
Converse Rubber Co., Malden, Mass.
Cooper-Bessemer Corp., Mt. Vernon, Ohio and Grove City, Pa.
Crescent Truck Co., Lebanon, Pa.
Davis & Geck, Inc., Brooklyn.
De Villbiss Co., Toledo, Ohio.
Dolomite Barge Plant, Dolomite Products Co., Gates, N. Y.
Elmer Street Plant, DeRossi & Son Co., Vineland, N. J.
Erie Plant, Bucyrus-Erie Co., South Milwaukee, Wis.
Estate Stove Co., Hamilton, Ohio.
Franklin Plastics Division, Robinson Industries, Inc., Franklin, Pa.
Federal Products Corp., Providence.
Foster Pump Works, Inc., Brooklyn.
Highland Park Division, Wood Mosaic Co., Louisville, Ky.
H. M. Harper Co., Chicago.
Henry Disston & Sons, Inc., Philadelphia.
Horni Signal Mfg. Corp., New York.
Ilex Optical Co., Rochester, N. Y.
J-M Service Corp., Johns Manville, Jones & Laughlin Steel Corp., Aliquippa Kansas Ordnance Plant.
Kearny Plant, Congoleum-Nairn, Inc., Kearny, N. J.
Kingsbury Ordnance Plant, Todd & Lempco Products Co., Bedford, Ohio.
Brown, Inc., La Porte, Ind.
R. G. LeTourneau, Inc., Peoria, Ill.
London Road Plant, Bryant Heater Co., Cleveland.
Midland Plant, Dow Chemical Co., Midland, Mich.
Monsanto Plant, Organic Chemical Division, Monsanto Chemical Co., Monsanto, Ill.
National Forge & Ordnance Co., Warren County, Pa.
Ontario Works Plant, General Electric Co., Ontario, Cal.
Pipersville Plant, William F. Fretz & Son, Pipersville, Pa.
Pullman Standard Car Manufacturing Company, Hammond, Indiana.
Radio Receptor Co., Inc., New York.
Schauer Machine Co., Cincinnati.
Southern Steel Co., San Antonio, Texas.
St. Marys Mfg. Co., St. Marys, Ohio.
St. Louis Plant, Chemical Warfare Service, Monsanto Chemical Co., Monsanto, Ill.
St. Louis Plant, Organic Chemicals Division, Monsanto Chemical Co., St. Louis.
Superior Engine Division, National Supply Co., Springfield, Ohio.
Superior Steel & Malleable Castings Co., Benton Harbor, Mich.
Tractor Works, Allis-Chalmers Mfg. Co., Springfield, Ill.
Toledo Dye Works, Textileather Corp., Toledo.
Vega Aircraft Corp., Burbank, Cal.
Warren Webster & Co., Camden, N. J.
Westinghouse Electric & Mfg. Co., East Springfield, Mass.
Whitmire Plant, Aragon-Baldwin Mills, Whitmire, S. C.
Whitney Blake Co., New Haven, Conn. Works, Aliquippa, Pa.

A NEW FITCHBURG GRINDER

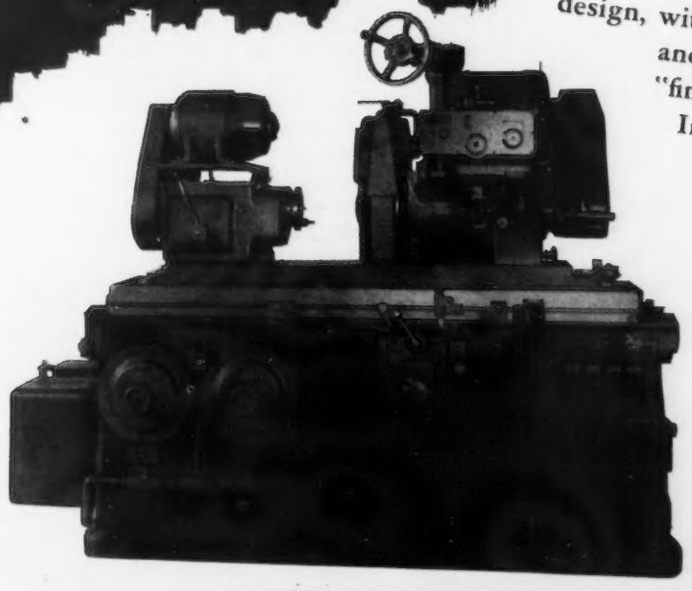
. . . . NEW AUTOMATIC PRECISION "TYPE B" PLAIN CYLINDRICAL GRINDER

Fitchburg announces another new grinder — the Fitchburg "Type B" automatic precision Plain Cylindrical Grinder. Into this new "Type B" are built all the essentials of rigid construction for accurate work and fine finish.

This new Fitchburg "Type B" Grinder is equipped with a Standard Bowgage Wheelhead unit with complete automatic cycle — rapid traverse to work, correct feed, grinding dwell and rapid return. This grinder is of modern design, with all mechanisms readily accessible and ease of operation is assured by "finger tip" controls.

In every detail it fills a definite need for a plain grinder where a machine is wanted for general plain cylindrical grinding, in large or small lots, with assurance of accuracy and fine finish at low cost.

Write today for complete details and information about machines with 10″, 18″, 48″ and 72″ capacity.



NEW FITCHBURG "TYPE B" — 10 inch PLAIN CYLINDRICAL GRINDER

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of — Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.

WEST COAST . . .

• Invitations go out for blowing in of Henry Kaiser's new blast furnace . . . Coast yards keep well below national average time required for ship construction . . . Aircraft wage situation still in uproar.

LOS ANGELES—In future years, the West Coast may celebrate another holiday between Christmas and New Years to commemorate the "blowing in" of the first modern blast furnace in this area. This week, the invitations say, the 1200 ton stack of Kaiser Co., Inc., iron and steel division, will come into production and enable the natives, who have become jaded looking at Rita Hayworth and test flights of secret aircraft, to enjoy the wonders of home made pig iron.

A suitable ceremony also will enable Washington, D. C., officials to view, many of them for the first time, the $75,000,000 steel plant which has been a center of controversy there from the time it was approved over the heads of the WPB iron and steel branch, and, incidentally, to take in the Rose Bowl Game and enjoy the California weather, the nature of which may not be discussed under censorship regulations. As at many a housewarming, much of the plant to be dedicated will be incomplete. There will be borrowed silverware and china, figuratively speaking, but at least the official delegation will be able to gather around the fire and toast the Axis. The event is a great personal triumph for Henry Kaiser himself who has pounded the accelerator voraciously to achieve early pig iron production at the plant. It would be an understatement to say that Coast pig iron consumers will not be happy to take any pig iron which is produced before the balance of the plant gets into operation. The halleluiahs cannot be too loud.

AT the other end of the metal working industry, shipbuilding, the West Coast picture is not entirely bright this week. One Maritime Commission contractor has launched well over a baker's dozen of hulls for the long range building program, but has been unable to complete them for lack of vital propulsion machinery. These seaworthy hulls are sitting, uncompleted, a monument to a section of the war program that slipped out of gear and the failure of a manufacturer to conquer unfavorable circumstances. As this is written two of the missing units have arrived, but there is indication of a further log jam of constructed hulls before the machinery begins to catch up.

Contrasted to World War I, however, the course of ship construction has been smoothed. In the last war, first keels were laid in September, 1917, for a family of riveted steel cargo vessels of 8800 dead weight tons each. Building time started at 160 days from keel to delivery, but instead of improving slowed until from January to May, 1918, it averaged approximately 280 days. From June to the Armistice, it was reduced to an average of 175 days. During 1919 the program continued at an average of 225 days, and during 1920, until completed, building time ranged from 300 to 350 days.

THE welded Liberty ships, designated by the Maritime Commission as EC-2's, the backbone of cargo carriers for this war, are vessels of 10,500 dead weight tons. As in the first war, construction time rose from 200 days at the beginning of the program in October, 1941, until January, 1942, when it hit 230 days, but from then on dropped like a thermometer in you-know-where. By April it was under 200 days, but in June under 150 days, by August under 100 days and as of Dec. 1, 50 days is the average for all United States yards building Liberty ships. Thus in 14 months, since the start of the Liberty ship program, the average time from keel to completion has been quartered, from under 200 days to under 50 days average for the nation. In World War I, for the same 14 month period, from September, 1917, until October, 1918, the completion time varied from 160 days at the start to 150 days in the 14th month.

Throughout the Liberty ship program, the West Coast yards have made an impressive record, keeping well below the national average time required for construction. From keel to delivery, the average time required at various stages of the program is as follows:

	West Coast Yards	All Other Yards
October, 1941	195 days	...
December	225 days	245 days
March, 1942	200 days	230 days
June	100 days	175 days
September	55 days	100 days
December 1	47 days	75 days

The enemy can take no comfort from the fact that the average time required still is decreasing. After launching hull No. 440 within four and a half days after keel laying and completing it within the week, the Richmond, California, Maritime Commission yards cut construction time on their next ten ships from a 40.6 day average to an average 31.9 days. The average should drop below 25 days early in 1943 at these yards.

THE final proof of the pudding in ship construction efficiency is in the total number of man-hours required per vessel, and consideration on this basis does not detract from the record of the West Coast Liberty ship builders. Accurate records include not only direct man-hours, but also indirect "overhead" hours for each yard and for each vessel constructed. Each yard naturally must chalk up more man-hours on its first ships than on succeeding vessels. One yard's record shows that more than 1,000,000 man-hours were charged against its first vessel over a period of 160 days from keel laying to delivery.

At the Richmond yards of the Maritime Commission man-hours charged against the first Liberty ship were approximately 800,000. By the fifth ship, this had been reduced to 700,000. By the 15th ship, to 560,000. Then the curve eased into a steady decline with

450,000 man-hours for the late 20's, the 30's and the early 40's among the ships in chronological order. By the 47th ship average man-hours had been reduced to 425,000 and although final figures are not available, it's a good bet that the ships currently being turned out have plunged through the 400,000 level. The one-week ship "Hull 440" took approximately 415,000 man-hours, and the probability that succeeding vessels will be under 400,000 is further indication that record breaking helps to develop techniques and teamwork which are reflected permanently in production efficiency.

Before the application of assembly line methods in shipbuilding, a cargo vessel of similar type to the Liberty required about 330 days to build, on an average. One shift operation, compared to the three now universally worked, naturally dragged out the building process. But the fact is inescapable that by prefabrication, sub-assembly and production line methods, ten ships are being built now in the time it formerly took to complete one.

INCREASED building speed also is reflected in computations of the tons of material erected per day. At the start in one yard, 300 tons was a day's work "handle." By spreading out the yard and perfecting the prefabrication and sub-assembly technique, material erection has been increased until it is over 1000 tons per day, over three times the volume handled at the start.

The West Coast aircraft wage picture, never noted for its calm and clarity, has shown no improvement since the report of Paul R. Porter to the War Labor Board upon hearings held by the panel which he headed. Porter's recommendations embody a series of compromise adjustments which would tend to lift the average wage fixed in southern California aircraft plants 6.5c. per hour. The parties to the dispute, including both AFL and CIO unions, the southern California aircraft manufacturers and Boeing, who were not affected in Porter's original recommendation, will all appear before the entire War Labor Board in Washington, D. C., on Jan. 8.

Even before the recommendations were announced, the AFL International Association of Machinists indicated that, having forebodings of a recommendation unfavorable to them, they would make no guarantee of accepting any findings. This organization even went so far as to call protest meetings at the plants for which they are bargaining agents for the threatened purpose of requesting withdrawal from the AFL no-strike pledge, but with the exception of a single meeting of union members at Consolidated Aircraft, such meetings were not held. The principal objection of the unionists is based on assertion that the Porter report fails to take into account wage differentials existing between aircraft and other Coast industries competing. Basic WLB policy says wage adjustments may not be made for controlling the flow of labor.

THE report emphasized the necessity of a stabilization plan of some sort in the aircraft industry from a national viewpoint. Particular attention was given to the numerous haphazard job classifications which have grown up piecemeal with the industry, with consequent pay inequities and wide pay differentials among workers performing similar functions at the various plants. If its recommendations are accepted, discrepancies between the wages of new workers and experienced workers would be leveled off. Porter suggests that along with the present program of automatic wage raises over a 12-week period for new workers an additional pay boost be given at the end of 16 weeks. The starting pay would remain the same, 60c., so that the base for employees with four months' experience would be 80c. instead of the present 75c.

Alabama Mining Institute Elects Governing Board

Birmingham

• • • **H. A. Berg,** president of Woodward Iron Co., Hugh Morrow, president of Sloss-Sheffield Steel & Iron Co.; J. W. Porter, president of Alabama By-Products Corp., and B. W. Norton, general superintendent, blast furnaces and mines for Republic Steel Corp.'s southern district, were reelected to the board of governors of the Alabama Mining Institute Dec. 15. The board of governors elected I. W. Rouzer president for a sixth term.

NEW IN OPEN HEARTHS: This D-2 Caterpillar tractor fitted with a Traxcavator is credited by the Timken Roller Bearing Co. with saving many days and man-hours in cleaning an open hearth slag pit. The job which usually requires from 3 to 6 days with 30 men was done with this equipment and 6 laborers in 2 days.

Fatigue Cracks BY A. H. DIX

New Year's Present

• • • Every decade or so you get an extra issue of your favorite family journal. This is one of the years and this is the 53rd issue. There can be 53 issues only when the first Thursday is Jan. 1, or, in the case of a leap year, Jan. 1 or 2nd.

We figured roughly that a 53-issue year would come every six years, but it doesn't work out that way, as the last lagniappe year was 1931. We would like to know what the sequence is, but so far have been unable to figure it out, as the leap year trips us up. It wouldn't be so bad if leap year could be depended upon, but as you know it skips the century years that are not divisible by 400. For example, 1900 was skipped, and so will be 2100. But that is too far ahead to worry about. If we knew how many 53-issue years there will be from now until say 2050 we would be satisfied.

Aptronym

The secretary and vice-president of the Chain Belt Co., Milwaukee, is A. R. Abelt.

—*John M. Lupton, Advertising Manager, Acheson Colloids Corp., Port Huron, Mich.*

Billions, They Said

• • • The New York World-Telegram is also having trouble with the handling of boxcar numbers:

> The gasoline moratorium affects some seven billion motorists who will be forced to walk or use public transportation facilities.

Roughly six of the seven billion seemed to be using the Lexington Avenue subway during the gasoline dry spell.

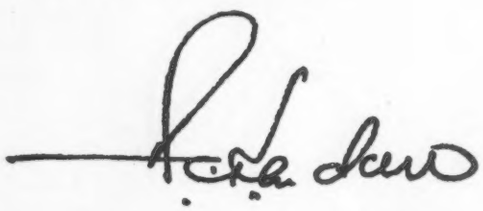
CMP Snowstorm

Interest in the workings of the Controlled Materials Plan is boundless. A one-inch announcement that we were issuing a 16-page booklet on the subject precipitated a blizzard of inquiries that exhausted the edition almost before it was off the press. A new edition of 24 pages reprinting latest information published in your favorite family journal is now ready. Price 25c. in stamps or coin. Please address us at 100 E. 42nd St., New York, and ask for "How to Operate Under CMP."

To say that this is the final word on CMP would be an exaggeration, as the Plan has not entirely jelled. But it is the latest word.

One Thought He Was Chinese

• • • Our v.p. and g.m., Charles Samuel Baur, enters this in the illegible signature contest:



This is the kind we like, for there is just enough semblance to legibility in it to encourage guessing. We submitted it to our decoding committee of six experts, who went into our quiet room with wet towels and aspirin, and emerged with these answers: P.C.K. Aden, P.C.R. Acken, P.C. Kaden, and P.C.R.A. Chen. Two asked to be excused. All were wrong. It disguises the signature of *Advertising & Selling's* editor, F. C. Kendall.

Apparently Horace Greeley started a vogue among editors. His writing could be read by only one of the Tribune's typesetters, and by him only by a liberal use of the imagination. There is a story that this typesetter's fellows inked the feet of a young pigeon and caused it to wander back and forth over a sheet of the particular kind of copy paper used in writing his famous editorials. The typesetter sweated over it, but finally got it in type.

Our own editor (and president), as you will see from page 25, could never make a living engrossing documents that start with "Whereas . . ." The first half is fine, but after "J. H. Van D—" you're on your own.

Chimes It Is

> See page 69 of your Dec. 17 issue—"light gage steel containers with or without chimes . . ."
>
> I have heard of musical glasses, saws, and even chairs. A barrel with chimes is a new one to me. Do you mean chines?
>
> —*L.E.R.*

No, we mean *chimes*. See dictionary—*Chime: the edge or brim of a cask, barrel, or tube. Chine* is an alternate, obsolete spelling. Where have you been?

Memory Test

• • • *Sozodont*, named by Deac's old Greek professor, crops up in a trade name list published in *Dividends*, a house magazine issued by Ketchum, MacLeod & Grove, the Pittsburgh adv. agcy. The list on the left is of products at one time heavily advertised but on which little advertising has been done in recent years. If you can identify the product in better than four out of ten cases your memory is uncomfortably retentive.

The list on the right consists of products well advertised today. If you don't score 100 per cent, come out of those clouds:

Star-Rite	Ipana
Hoosier	Del Monte
Barrington Hall	Campbell's
Sozodont	Mum
Raytheon	Woodbury's
Bunte	Kellogg
McCray	Philco
Boyce	Waterman
Neponset	Mennen
Hassler	Gillette

(The key to the left hand list is electric appliances, kitchen cabinets, coffee, dentifrice, radio tubes, candy, refrigerators, Moto-meter, floor coverings, shock absorbers.)

Lady Welders Out in Cold

> W. Spraragen, of the American Welding Society, writes: We have been asked to advise welding engineering publications that the Society has decided to officially use the term "welding operator" rather than "welder" or "weldor" to indicate the ***man*** operating the welding equipment.

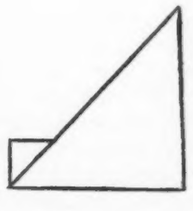
Mr. Spraragen pointedly underscores *man* to make it clear that women are not included. This strikes us as less than chivalrous. Are lady welders to be nameless? If the Society rejects women and also our invention, *weldist*, we offer it without strings to the lady welders, with the suggestion that they add an "e," making it *weldistes*.

This will leave *weldist* for the men, who will adopt it in time, as *welding operator* is too long.

Puzzles

Last week's commuter walked for 50 minutes.

The side view of the Dec. 17 figure is, according to John Howe Hall, that appearing on the right.



We dislike trick problems and although the following is of the tricky variety, after the trick is exposed it becomes a genuine one:

A boy wants to cross a bridge which is strong enough to stand his weight plus 10 lb. The boy has promised to deliver 3 balls, each weighing 5 lb., to the far side, and all at the same time. How does he do it?

The tricky answer is, as you know, that he juggles the balls. But the real problem comes in determining whether the force required to propel the balls into the air will cause the carrying capacity of the bridge to be exceeded.

Dear Editor:

ELECTRONIC INSPECTION

Sir:

I would appreciate any information you could give me on inspection by means of electronic devices.

B. GOLDSTEIN,
Chief Methods Engineer
General Instrument Corp.,
Elizabeth, N. J.

• The Nov. 18, 1937, issue of THE IRON AGE had an article on Ford Motor Company's inspection methods using electronic devices. It was based on equipment built in the Ford trade school. The article is not particularly specific, but we do not know what else to recommend to you, as little has appeared in print on the subject.—Ed.

STEEL DISTRIBUTION

Sir:

Every year in one of your issues, you show a tabulation of the distribution of steel over various industries.

We are now trying to locate this information for the year 1941 and would appreciate your advising us at your earliest convenience in what issue of THE IRON AGE this information is given.

A. SELL,
Purchasing Agent
Worden-Allen Co.,
Milwaukee, Wis.

• See page 52 of the Jan. 1, 1942, issue of THE IRON AGE. Next week's issue will carry distribution figures for 1942.—Ed.

PLATING ON NON-METALLICS

Sir:

Are there any articles on plating with metals on non-metallic surfaces in any late issue of your publication?

WARREN CHESTER
Monrovia, Cal.

• Several recent articles in THE IRON AGE on this subject have been reprinted in booklet form, and a copy is being sent you.—Ed.

METAL SPINNING

Sir:

Your July 16, 1942, issue contains an article by G. F. Sullivan, "Industrial Metal Spinning," mentioning the name of Edward Young. Could you give us his address?

W. VAN HOLDEN,
General Manager
Joseph Sankey & Sons, Ltd.,
England

• 304 Morgan Ave., Brooklyn, N. Y.—Ed.

LATHE STANDARDS

Sir:

We have been trying to locate a copy of the "Standards of Accuracy" revised April 10, 1942. It is our belief that this is a publication of the American Machine Tool Builders Association.

We have not found either the Association, or the book. Can you shed any light on the matter?

C. GEO. BEAM,
Purchasing Agent
Wooldridge Mfg. Co.,
Sunnyvale, Cal.

• Probably you have in mind "Lathe Standards of Accuracy," published by the National Machine Tool Builders Assn., 10525 Carnegie Ave., Cleveland. This booklet shows how a lathe can be checked for accuracy with dial gages. For similar methods applied to all classes of machine tools, see "Standards of Accuracy for Machine Tools," by Dr. George Schlesinger, published by the Industrial Press, 148 Lafayette St., New York. The American Standards Assn., 29 W. 39th St., New York, also has available a pamphlet on fits and tolerances.—Ed.

GEAR STRENGTH

Sir:

From your knowledge of the various societies and associations to which manufacturers of spur gears might belong, could you tell us to whom we might apply to get information on modern methods of figuring the strength of gears that are fabricated from alloy steels?

A. M. HARRINGTON,
Treas.
Harrington Co.,
Philadelphia

• The American Gear Manufacturers Assn., 301 Empire Bldg., Pittsburgh, Pa., which will undoubtedly be able to supply you with printed or mimeographed material on calculation of spur gear strength.—Ed.

BLACKENING PROCESS

Sir:

Where conditions will permit, we are interested in substituting for cadmium or zinc plating a suitable blackening process for a variety of our products. We would appreciate the names of reputable concerns controlling such precesses.

W. CORTLYN RHODES, JR.,
Production Engineer
Air Associates, Inc.,
Bendix, N. J.

• Some sources are: Alrose Chemical Co., Providence, R. I.; Heatbath Corp., Springfield, Mass., and Mitchell-Bradford Chemical Co., Bridgeport, Conn.—Ed.

SCREW THREAD STANDARDS

Sir:

We would appreciate any information you can give us on "Screw Thread Standards for Federal Services—1942" published as National Bureau of Standards Handbook H28.

You made reference to this in your Nov. 26 issue.

JOHN M. BISHOP,
President
Accessories Manufacturers, Ltd.,
Montreal

• Screw Thread Standards is issued by the National Bureau of Standards, Washington, D. C.—Ed.

FOOLPROOF GAGING

Sir:

I understand that reprints of the article, "Foolproof Gaging System" developed by Army Ordnance, by J. B. Nealey, which appeared in the September 3, 1942, issue of THE IRON AGE are now available. Would you kindly send me information as to how I may obtain such reprints and their cost?

THEODORE G. HECK,
Chicago

• We are sending you one. No charge.—Ed.

BORON

Sir:

Please send me two sets of tear sheets on the article, "Boron" by T. W. Lippert, in the November 19, 1942, issue.

E. A. STACK,
Metallurgical Engineer
Bliss & Laughlin, Inc.,
Harvey, Ill.

PLY-WOOD

Sir:

Can you tell us what issues of THE IRON AGE contained articles on plywood?

ROBERT MONKS,
Pres.
John Monks & Sons,
New York City

• See the article "The Use of Plywood in Aircraft Construction" in the issues of April 10 and 17, 1941, and also "Ply-wood Match Plates" in the January 8, 1942, issue.

CUTTING OILS

Sir:

I don't recall having seen any discussion of cutting oils in THE IRON AGE for some time. I wonder if you can refer me to a rather generalized "primer" on the subject or a critical abstract with bibliography.

B. R. HAUEISEN
Lukas-Harold Corp.,
Indianapolis

• Dr. O. W. Boston, is the leading independent authority on cutting oils. An inquiry addressed to him at the University of Michigan, Ann Arbor, Mich., would doubtless be the means of getting you an up to the minute bibliography. The 10-page article, "Influence of Cutting Fluids on Metal Cutting," in THE IRON AGE issue of Oct. 13, 1938, is still an excellent primer on the subject, being based on the work of Dr. Boston and other members of the A.S.M.E. Special Committee on Cutting of Metals.—Ed.

This Industrial Week . . .

- **Manpower Shortage Spreads to Steel Industry**
- **Skilled Workmen Found Idle in Some Areas**
- **Tank Cutback 20 Per Cent, Campbell Declares**
- **Republic Strike Loss 6700 Tons of Ships' Plate**
- **Ingot Production Gains Half Point to 99 Per Cent**

NINETEEN FORTY-THREE begins with strong indications that shortages of manpower in vital sections of the metalworking industry soon will build up into a major wartime headache.

Up to now most steel centers, for example, have reported an ample supply of workers, the relatively low amount of overtime supporting the reports that manpower in such areas was sufficient to do the job.

This week, however, the Youngstown, Ohio, area—first of the steel towns to be so affected—found its labor frozen under a stabilization plan intended to promote orderly recruiting and transfer of workers from non-essential to essential industries.

The reason for the freezing of Youngstown steel workers was a constantly growing shortage. At midweek this was estimated at above 5000 men, with 27 larger war plants in the area alone in need of approximately 2500.

In Youngstown, as in other areas short of labor—Cleveland is slated for an early labor freeze—the stabilization plan bars employers from hiring or soliciting workers engaged in critical occupations, from hiring persons who have lived in the area less than 30 days (except by consent of the U. S. Employment Service), and from hiring an essential worker except when he presents a statement of availability issued by the U. S. Employment Service or his last employer.

Union contracts are not affected by the Youngstown labor stabilization plan, which covers only individual workers and more than 60 occupations. (One of the critical occupations is, as might be expected, that of "Employment Interviewers.")

ANOTHER big industrial center likely to meet labor shortages soon is Pittsburgh where one steel fabricating company, already short of help, this week was considering adoption of two ten-hour shifts to replace the present three eight-hour day working schedules.

Yet a report prepared this week by THE IRON AGE, with the cooperation of the U. S. Employment Service, and carried on page 65, indicates that there still are unemployed skilled workmen who are vitally needed in some industrial areas. Thousands of such men, according to a compilation by THE IRON AGE, have registered their skills as being available to war plant managers.

As the New Year begins, there is little change in the urgency of the demand for steel. Some steel companies report December bookings from 2 to 10 per cent above November and in most cases steel backlogs in the last 10 days have increased slightly.

Industry gradually is learning what the recent and current readjustments in ordnance manufacturing programs will mean in the way of easing supplies of steel and other metals. Maj. Gen. Levin H. Campbell, Army chief of ordnance, told THE IRON AGE in an exclusive interview this week that such readjustments will "mean absolutely nothing" to industry as far as a diminishing demand for steel is concerned.

Cutbacks in manufacture of tanks, some types of guns and ammunition in recent weeks had been expected to free some material for more essential civilian uses.

"NEW emphasis on merchant ships, destroyers, submarines and airplanes will balance the slack in demand caused by cancellation of contracts for anti-aircraft guns, tanks and ammunition," Lieut. Gen. Campbell told THE IRON AGE.

Pointing to a stack of papers on his desk, the ordnance chief drew an analogy to the present steel situation by comparing paper with steel. "It's all what you want to make of it, whether envelopes or memo pads—tanks or destroyers."

Revealing for the first time the extent of the readjustment of production sights, General Campbell said that in his opinion the overall percentage of contract cutback would not amount to more than 15 per cent of the program proposed for 1943. (One authority has placed the number of ordnance contracts at 88,000. On this basis, approximately 13,200 contracts would be dropped.)

Programs for anti-aircraft guns and fire control apparatus will be curtailed 15 to 20 per cent. The tank cut will amount to 20 per cent while trucks, which were revised about six months ago as to type and models, will be whittled 15 per cent. Contracts for ammunition will drop 10 to 12 per cent.

"You cannot tell anything about the qualities of a weapon until it is out into the hands of a fighting man in actual combat," General Campbell said, in explaining the need for fluidity of production planning. "Our customers are the various combat branches of the service and if we can't give them what they need, the Army should give up the job to someone else." He said that ordnance must keep up with the changes in battle demand, a barometer which constantly fluctuates according to varying strategy.

THE trend in bombs for the armed forces is now toward larger sizes, hence the relative number of smaller bombs is being steadily lowered. Shifts in machine gun design are being made, with some types being abandoned, and the production of others accelerated, the ordnance chief said.

General Campbell had a kind word for the arms industry. He said: "The ordnance job is being run by industry. The men who are doing this job are 97½ per cent Reserve Officers out of industry with only 2½ per cent of them old Army men. We have the finest production scheduling men from the automotive industry, from research laboratories and men representing every kind of industry."

"If you were a metallurgist, or other type of technical man," said General Campbell to an IRON AGE *staff man, "I would put a uniform on you."*

"You know I have as advisers Benjamin F. Fairless (president, U. S. Steel Corp.), K. T. Keller (president, Chrysler Corp.), and Lewis Brown (president, Johns-Manville Corp.), and they come in and assure themselves that I am doing all right. They have a stake in this show. They send schedulers down and get the boys from downstairs and ask questions.

"Barney Baruch comes over and digs in, and he doesn't want to be discredited by what we do over here, and with all this help, if we don't have the job buttoned up, I don't know who could."

CLOSER observers of the steel industry like to point to the numerous conversion deals as typical of what is being done voluntarily, by industry to aid the war effort. Unprecedented cooperation among various steel mills in the last few months has resulted in production of hundreds of thousands of tons of finished products which otherwise would not have been produced. This trend will rise sharply in 1943.

This week there was evidence, however, that there is room for more cooperation on other fronts, such as labor. Republic Steel Corp.'s strip mill at Cleveland, one of the fastest units of its kind in the world, was down five turns through what the CIO-USWA called a "lockout" and steel company officials termed a walkout. This strike, the most serious in the Cleveland area since Pearl Harbor, caused an estimated loss of 6700 tons of plate, almost all of which was destined for shipyards.

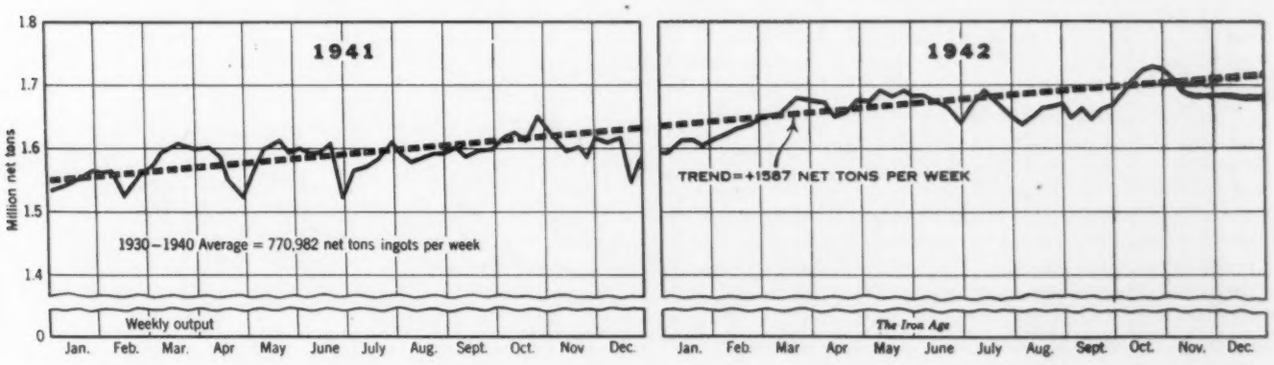
The Republic dispute arose over a change in working schedules, the union charging the steel company with violation of the President's order requiring double time for the seventh consecutive work day. For many years, a split-week work schedule has been in force without double time for the seventh work day. This schedule covered two work weeks, with days off at the beginning and end of the work period. As a result of the President's order, a new schedule obviating payment of double time for a seventh work day was drawn up by the steel company.

REPUBLIC STEEL'S management notified the War Labor Board and other government agencies that the strip mill strike was a violation of the union's non-strike pledge in a contract signed in August. In the meantime work was resumed pending discussion of the dispute this week before the WLB.

Steel ingot production this week climbed a half point to 99.5 per cent of capacity, according to estimates by THE IRON AGE. Operations in the Cleveland district rose a half point to 99 per cent and in Buffalo two points to 106.5 per cent. Birmingham output is up a point to 98.5 per cent and Cincinnati reports a five-point advance to 105 per cent. St. Louis operations are two points higher at 107 per cent and the Eastern area is up five points to 95 per cent. Melting rates in Wheeling declined to 86 per cent from 90 per cent last week while Detroit dipped one point to 101.5 per cent. Operations in the three largest steel-producing districts are unchanged, Pittsburgh holding at 100 per cent, Chicago at 102 per cent, and Youngstown at 100.5 per cent. Philadelphia reports an unchanged schedule at 92 per cent.

DIFFICULT weather in some areas has slowed scrap collection and preparation, forcing consumers to dig deeper into their stockpiles. Reports from some points show that household scrap collections when repeated are below expectations.

WPB efforts to conserve steel for more critical war purposes is reflected in a decline in fabricated structural steel business booked in November to 45,972 tons, lowest on record since 1921.



Steel Ingot Production by Districts Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	S.Ohio River	West	St. Louis	East	Aggregate
December 24	100.0	102.0	100.5	92.0	98.5	104.5	90.0	97.5	102.5	100.0	102.0	105.0	90.0	99.0
December 31	100.0	102.0	100.5	92.0	99.0	106.5	86.0	98.5	101.5	105.0	102.0	107.0	95.0	99.5

OEM Photo by Palmer

Steel Man with a Mission

. . TO KEEP THE ELECTRIC FURNACES MELTING

ALL of us—men or women—on the job or off it—are people with a mission these days. This war makes common cause for every one and spares no one.

The maintenance-man's job, atop an Allegheny Ludlum electric furnace, is no less essential than that of the crew who operate the furnace, nor than that of the fabricators who use the stainless, tool, valve or electrical steel it produces. Total war demands maximum cooperation on the supply fronts as well as the fighting fronts, and it asks also that every last bit of manpower and materials be used to maximum advantage.

Boiled down to a very few words, that simply means: *no waste—everybody help.* How can we help *you* to produce better and faster for war; to stop the loopholes of waste; and to plan your course in post-war production?

For your designers and technicians, complete and certified laboratory data on all Allegheny Ludlum alloy steels are available in "Blue Sheet" form. For your engineers and production men, our "Handbook of Special Steels" contains comprehensive and valuable information; and our "Elementary Discussions," covering Tool and Stainless Steels were developed particularly for training course and student use.

Write for any printed material that will help you; and if you need personal assistance, the services of our Technical Staff are at your command.

Allegheny Ludlum
STEEL CORPORATION
BRACKENRIDGE, PENNA.

A-8711 . . . W & D

Army of Skilled Workers Found Available for Industry in 41 Strategic Classes

• • • **In the clamor** over skilled manpower shortages, more than 126,000 skilled workers still are available in 41 strategic job classifications necessary to the iron and steel and metal working industries. These were not hard to find—they have been there all the time and the government has been offering them on the labor market for some time. Who are they? Not the blind, the lame and the halt.

Regardless of the reason for their absence from your employment, they represent a bonafide labor reserve.

These men (and women) are on the rolls of the United States Employment Service and are available on request. THE IRON AGE statistical table shown with this article was compiled from latest official USES figures furnished by the Reports and Analysis Division, formerly of the Security Board but more recently taken over along with the USES into the War Manpower Commission.

Each of the 41 classifications of skilled employment covered by the table was chosen from Administrator Paul V. McNutt's Critical Occupation List so that it would give specific data on critical occupations of interest to the iron and steel and metal working industries. The 126,572 workers recorded on the table represent less than half the number actually available when the big push for help comes as these figures reflect the totals of only those who are actually in a position to change jobs at once.

In addition to these workers, there are at least again that num-

Regional Areas of the United States Employment Service

(Now a Division of the War Manpower Commission)

To determine the location of the regional areas of the United States Employment Service referred to in the accompanying table of available skilled manpower, check this map. Locate your own area and surrounding areas by number then refer to the proper columns in the table to learn the number and location of skilled workers that are available in each of 41 different critical classifications. These workers are available to war industries. Place your request with your nearest United States Employment Service office of which there are 4500 in the United States.

ber who have indicated on their occupational questionnaires that they have training, experience or skill in these job classifications.

While these men who have rated skills, but are not working their trade, have not been called to war work to date, there is a possibility that this may occur when the manpower shortage becomes sufficiently acute. The USES has about two million of occupational questionnaires already classified for later use and is continuing the work as rapidly as possible. Skilled manpower is still available.

Employers requiring skilled workers can obtain them through the services of the United States Employment Service. All that is needed is to apply to the nearest USES office and specify the type of worker you need. If the job classification you need is shown on the accompanying table, your local USES office will know exactly where to place your request. Otherwise, through the USES system of inter-office clearance they can locate the type of worker you need within a short time. (You will note that totals of workers are shown for each USES region. Find your own region on the accompanying map and check the worker-availability there before seeing your USES office. This will speed the process.) No difficulty in locating a USES office should be experienced as there are 3000 full time offices and 1500 part time.

When making application for workers it is necessary to state the type of skill required, working hours, wage rate, etc. A tip on this subject is to request the lowest type skill possible for the specific job or to state a second and third choice of skills.

By so doing the USES is given much greater opportunity to select men who can do the job. By means of job and skill analysis the USES has accurately ascertained the minimum amount of skill required to do a given job efficiently and the up-grading possibilities of certain degrees of skill. In addition, complete studies have been made in many industries as to the conversion possibilities of certain types of skills to related work in war industries. Thus, by giving the USES a little leeway in your manpower specification, this additional "know-how" can be put to use in finding the workers you need.

Another reason for specifying the lowest usable skill on application to the USES is that highly skilled workers are less likely to move to new sections of the country, knowing that their highly-prized skills will likely find employment of a more satisfactory nature than their present job, somewhere in their own area. Beyond these hints, nothing more than an application is required to set the USES machinery in search of the help you need.

In addition to revealing the scope and extent of skilled manpower still available, the accompanying table should serve several other purposes. Use it to determine most needed training subjects . . . as an availability guide to deferment requests.

Available Skilled Manpower Supply

Developed from latest figures of the United States Employment Service, Washington, D. C. See accompanying map on Page 65

OCCUPATIONAL CLASSIFICATION	UNITED STATES EMPLOYMENT SERVICE REGIONS												
	Region I	Region II	Region III	Region IV	Region V	Region VI	Region VII	Region VIII	Region IX	Region X	Region XI	Region XII	Total
Drafting (Involving Development)	130	224	481	107	240	660	97	75	418	109	26	283	2,850
Drafting (No Development)	153	894	467	86	220	504	184	127	440	145	42	278	3,540
Machining (Involving Set-up)	388	538	1,061	284	1,161	1,606	629	223	1,107	328	164	553	8,052
Metal Turning (Involving Set-up)	672	539	1,371	161	1,093	1,633	225	376	1,161	235	49	300	7,785
Metal Milling, Profiling, Hobbing (Set-up)	224	274	319	33	414	652	58	61	194	87	8	40	2,364
Metal Boring, Drilling, Reaming, Threading	673	746	1,805	128	3,083	3,900	412	256	1,275	255	36	453	13,022
Metal Planing, Shaping, Facing (Set-up)	61	54	177	28	399	289	34	27	79	24	3	16	1,191
Metal Grinding and Polishing (Fixture Held)	287	218	426	36	868	791	62	95	194	43	16	70	3,106
Hoisting, Complex Machine Operation	197	257	1,126	251	1,013	1,279	657	275	781	323	109	451	6,719
Metal Forming or Forging (Power Press or Hammer)	40	65	98	7	210	234	20	7	73	15	3	10	780
Metal Forming or Straightening (Set-up) Rolling	2	24	48	13	56	49	9	2	13	1	2	1	220
Metal Rolling (Adjusting and Setting Rolls)	6	17	6	6	141	81	32	4	24	...	2	12	331
Sand Molding, Coremaking (Hand)	233	187	983	116	1,401	1,816	864	200	486	105	33	130	6,554
Electrical Wiring (Install. and Maint.)	208	1,108	678	300	678	907	546	364	852	323	118	369	6,451
Electrical Repair (Motors, Generators)	276	644	937	211	710	1,303	380	160	711	232	87	386	6,037
Welding, Electric (Pressure or Resistanc3)	102	164	305	29	1,111	894	121	34	286	23	9	80	3,158
Welding, Arc	361	228	872	359	981	1,588	732	395	1,075	619	86	628	7,924
Welding, Electric and Gas	42	76	153	145	990	1,218	235	311	829	356	58	239	4,650
Welding and Flame-Cutting (Gas)	214	408	1,041	195	872	1,307	550	273	1,249	381	73	439	7,002
Tool Room Forging and Tool Dressing (Heat Treating)	133	207	608	258	679	723	489	242	862	442	79	232	4,954
Structural Steel Assembly and Erecting (Not Mach.)	229	1,142	949	385	1,021	1,498	810	279	1,157	493	73	937	8,973
Structural Steel Assembly (Machine Operation)	42	258	218	44	169	204	64	53	193	97	18	51	1,411
Laying-Out, for Forming Metal (Development)	16	9	35	4	50	98	14	19	72	46	10	57	430
Metal Melting and Hand Casting	31	48	25	1	17	14	6	5	19	6	1	4	177
Metal Smelting or Melting (Complex Fce. Opr.)	14	18	123	16	72	87	18	6	47	5	9	7	422
Heat Treating (General)	18	18	46	4	67	98	11	10	14	8	1	15	310
Metallurgical and Dimensional Inspecting (Precision)	6	13	47	15	33	31	24	11	63	57	1	46	347
Metallurgical Inspecting and Testing	3	1	28	2	54	60	4	2	20	4	...	9	187
Metal Sawing	20	15	33	4	61	16	13	8	14	5	...	13	232
Metal Turning (No Set-up)	930	206	1,076	53	1,872	3,041	77	87	200	250	13	28	7,843
Metal Milling, Profiling, Turning (No Set-up)	313	109	161	14	578	480	24	26	64	212	7	19	2,007
Metal Boring, Drilling, Reaming, Threading (No Set-up)	53	26	44	5	132	79	17	17	28	3	...	9	413
Metal Planing, Shaping, Facing (No Set-up)	3	...	3	17	12	...	...	1	2	...	...	1	39
Metal Forming, Forging (No Complex Set-up)	42	30	192	18	280	253	31	16	94	18	4	35	1,013
Hoisting (Simple Machine Opr.)	9	75	44	12	18	13	18	6	12	36	...	42	285
Metal Casting, Pouring	13	14	52	9	107	125	31	8	44	5	1	20	429
Furnace Charging Machine and Opr. (Metal Melting or Swelting)	...	3	60	9	60	75	19	3	39	1	...	5	274
Furnace Charging (Hand)	3	4	54	9	119	108	47	3	39	6	1	10	403
Metal Heating	23	69	433	51	309	338	93	17	133	10	1	34	1,520
Inspecting, Dimensional-Precision (Simple)	89	49	198	9	1,004	732	65	16	77	3	2	11	2,255
Metal Rolling (Feeding and Catching)	13	6	383	59	258	116	48	1	54	1	2	10	951
Total	6,272	8,985	17,164	3,493	22,613	28,900	7,770	4,101	14,494	5,292	1,145	6,343	

Greatest Year in Steel Reviewed by Tower

By WALTER S. TOWER

President, American Iron and Steel Institute

• • • **In 1942,** the steel industry of the United States responded to the urgent needs of a nation at war by producing, for the third successive year, a record-breaking tonnage of steel.

More than 86,200,000 tons of steel ingots and castings were produced in 1942, a total exceeding by 3,400,000 tons the peak established a year ago. Typifying steel's greater role in modern warfare, the tonnage produced in 1942 was 70 per cent above the maximum production in any year of World War I.

Already operating on a wartime basis before the attack on Pearl Harbor, the steel industry entered 1942 determined to fulfill its obligation to produce whatever steel the nation requires, whether in peace or in war.

Cold statistics cannot describe the exertion and ingenuity which six hundred thousand workers in the industry put forth in offices and mills to make the new production records possible. Statistics can, however, indicate how thoroughly the industry discharged its responsibilities last year.

For example, to meet the urgent demand for steel plates in 1942, the industry produced the astounding total of 11,600,000 tons of plates—almost 90 per cent more than the record production of 1941. That tonnage was far above the capacity of the standard plate mills of the industry.

Such an output of plates was achieved by making certain changes in the continuous wide strip mills which a number of companies had installed, largely in the past ten years, to roll sheets and strip for automobile bodies and similar unwarlike uses. In remarkably short time, those mills were converted to roll the heavier product, with the result that at the end of 1942 they were rolling fully 45 per cent of the plates produced in 1942.

Similarly, the industry moved quickly and efficiently to meet the need for alloy steels in tonnages undreamed of in years of peace. Nearly 11,400,000 tons of high grade alloy steels were produced in 1942, about 40 per cent more than the record tonnage produced in 1941, and almost six times the 1918 output. An important factor in increasing alloy steel production for war needs has been the expansion of electric furnace capacity by 150 per cent since the outbreak of war in Europe.

In the field of alloy steels, an outstanding achievement in 1942 was the development by steel company metallurgists of a completely new series of low-alloy steels known as the National Emergency (NE) steels. These steels help to conserve strategic and critical materials, yet they are entirely satisfactory alternates, in quality and performance, to the higher-alloy steels which they replace. One such series of steels was developed in steel plant laboratories at the urgent request of the War Production Board in a period of only ten days.

Along with the new production records established last year, steel employment and payrolls likewise reached new peaks. An average of nearly 650,000 employees was at work during the year, including a small but gradually increasing number of women. Payrolls for the year totaled $1,450,000,000, while average hourly earnings of wage earners reached a new peak

ORE GLACE: Completing her first season on the Lakes, the Irving S. Olds, 18,000 ton freighter of the Pittsburgh Steamship Co., hove into port with an 18-in. coating of ice. This ore carrier was named for "Big Steel's" board chairman.

TROOP TRAILER: This three platform truck-trailer is designed as a troop transport by the Utility Trailer Manufacturing Co., Los Angeles. Its seating capacity is figured at 206 men and the unit rolls on 14 wheels and 4 axles. The vehicle is undergoing Army tests.

of $1.04 per hour. In 1941, the best previous year, the industry employed 633,000 workers and disbursed $1,300,000,000 in payrolls. Hourly earnings averaged 96 cents per hour.

Since January, 1940, steel producers in this country have greatly expanded their producing facilities. They have built in that period the equivalent of a new steel industry almost as big as the entire steel industry of Great Britain.

By July 1, 1943, the American steel industry is expected to have facilities to produce steel at the rate of 96,000,000 tons annually. At the same time, pig iron capacity has been expanded through the construction of new blast furnaces.

Therefore, unless the supplies of scrap available for steelmaking next year fall far short of what is expected at this time, the steel industry should find itself with sufficient capacity and supply of metallic raw materials to establish in 1943 new production records for the fourth consecutive year.

The scrap situation was not too encouraging throughout most of 1942. However, the nationwide scrap drive, supported by the steel industry's contribution of $1,500,000 for an advertising and publicity program, helped bring out new supplies of scrap, and the effort was aided further by the activities of some two thousand steel company salesmen. For the past several months, these salesmen have been calling on steel-consuming plants to stimulate the salvage of obsolete or long-idle equipment and supplies. A substantial tonnage of high grade scrap has already been uncovered through their efforts, and more is in prospect.

Under the new Controlled Materials Plan, distribution of the steel produced next year holds the promise of being more efficient and equitable than under the methods used to direct the distribution of steel among various industries thus far during the war period.

Large and uneconomic inventories of steel, such as are now believed to be in existence in many steel-consuming plants should no longer be needed or continued under the proper operation of the new plan. As a result, the proportion of steel production going directly into manufacture should be higher in 1943 than it has been in some past periods.

JOMINY TEST SHOWN: The Jominy end quench test is shown being made on a piece of NE steel by a metallurgist at Joseph T. Ryerson & Son, Inc., Chicago. What appears to be a glass dome in the photograph is actually a spray of water which impinges on the end of the Jominy specimen. A complete description of the test and equipment is contained in a new Ryerson booklet.

Furthermore, the amount of steel to be used next year for new plant construction is expected to be very much less than was used for such purposes in either of the two preceding years. This likewise will help to make available more steel for direct war uses and for essential civilian needs.

Direct war uses took steel in tremendous tonnages in 1942, perhaps as much as 60 per cent of all that was made. The shipbuilding industry, for example, was furnished with more steel than the automobile industry ever consumed in any year. However, industries which primarily serve basic civilian needs of the country, as well as contribute to the war effort, also received steel in substantial tonnages during the year under priorities and allocations from the War Production Board.

Thus, shipments of steel in 1942 to such industries as railroads, public utilities and can manufacturers were not far below the high mark of 1941 and, in some cases exceeded shipments to the same classes of industries in 1940.

For 28 consecutive months, since September, 1940, the steel plants of the United States have been operating at a rate of 90 per cent or more of capacity. In 23 of those months, operations have exceeded 95 per cent of capacity. Such a sustained period of operations at forced draft has never before been achieved.

Today, despite the long and continued pressure upon steel plants and personnel, the trend of steel production is up. The steel industry looks forward to 1943 confident that it will be able to produce whatever tonnages of steel are required by the war agencies and for the vital needs of the civilian population.

Suits Alleging Discrimination May Be Carried to High Court

Cleveland

• • • **The dismissal** by Common Pleas Court last week of the suits of two Cleveland colored women who charged three war plants here with employment discrimination brought a temporary lull in a controversy that may assume larger proportions before the end of the war. It was stated that the cases will be taken to a higher court by the plaintiffs, and they "are prepared to go all the way to the United States Supreme Court if necessary," Attorney Chester K. Gillespie stated.

In dismissing the actions against Thompson Products, Inc., its subsidiary, Thompson Aircraft Products, Inc., and the Warner & Swasey Co., the judge ruled that "courts cannot interfere in the management

Huge Ore Deposit Located in Michigan

Lansing, Mich.

• • • **State geologist** R. A. Smith has reported that 2,500,000,000 tons of magnesium-bearing ore have been located in Upper Michigan, said to be the largest supply of high grade dolomite ore in this country.

The deposit extends in a 180 mile strip from the eastern end of Drummond Island to a point near Manistique. Dr. Smith said the ores yield 19 per cent of their weight in magnesium, a somewhat higher ratio than other deposits. He indicated that the question of cost would determine whether the ore deposits would be exploited in preference to extracting magnesium from brine.

Compositions Changed In Certain NE Steels

• • • **Modifications in** the National Emergency steel compositions made necessary by unexpectedly greater amounts of nickel content in scrap now available were approved in Washington Dec. 17, by representatives of WPB, the technical committee on alloy steel of American Iron & Steel Institute, and by representatives of the Iron and Steel Division of the SAE.

The average nickel content of scrap has been steadily increasing, due partly to the influx of new nickel-containing steel scrap generated as a result of ever-increasing production of war materials, and partly to the conservation measures employed by steel mills.

Consequently, many steel mills find it virtually impossible to hold the nickel content of some of the NE steels below 0.60 per cent as originally specified for many of the NE grades. There is not available efficient carbon steel scrap low in phosphorus and sulphur content to dilute the high nickel scrap, and it is commercially impracticable to reclaim the nickel for any other use or in any other manner.

This condition prevented production in many mills of the NE 9400 series steels which have a specification limit of 0.20 to 0.40 per cent nickel and resulted in "off-analysis" heats in the 8600 and 8700 series.

The high nickel content of the scrap in recent weeks has often prevented alloy steel producers from bringing heats of NE steels within the specified compositions, resulting in last minute switches of heats already in process to steels of higher specified nickel content, thereby complicating manufacturing procedures and delivery problems.

That situation has frequently resulted in the use of greater quantities of virgin nickel and sometimes of other elements such as chromium or molybdenum as well, than would have been necessary if the original intent had been to charge nickel scrap to produce the high nickel steels.

To alleviate those conditions and to make more efficient use of the alloying elements derived from scrap, the following revisions in the list of NE steels have been made.

The following compositions have been deleted:

NE 8022	NE 8735
NE 8339	NE 8739
NE 8949	NE 8740
NE 8715	NE 8744
NE 8722	NE 8749

In requesting deletion of the NE 8700 series, the War Production Board is attempting to conserve molybdenum and to make possible more flexible use of scrap generated in the steel mills.

The NE 8600 series has been extended to compensate for the deletion of the NE 8700 series by the addition of the following compositions:

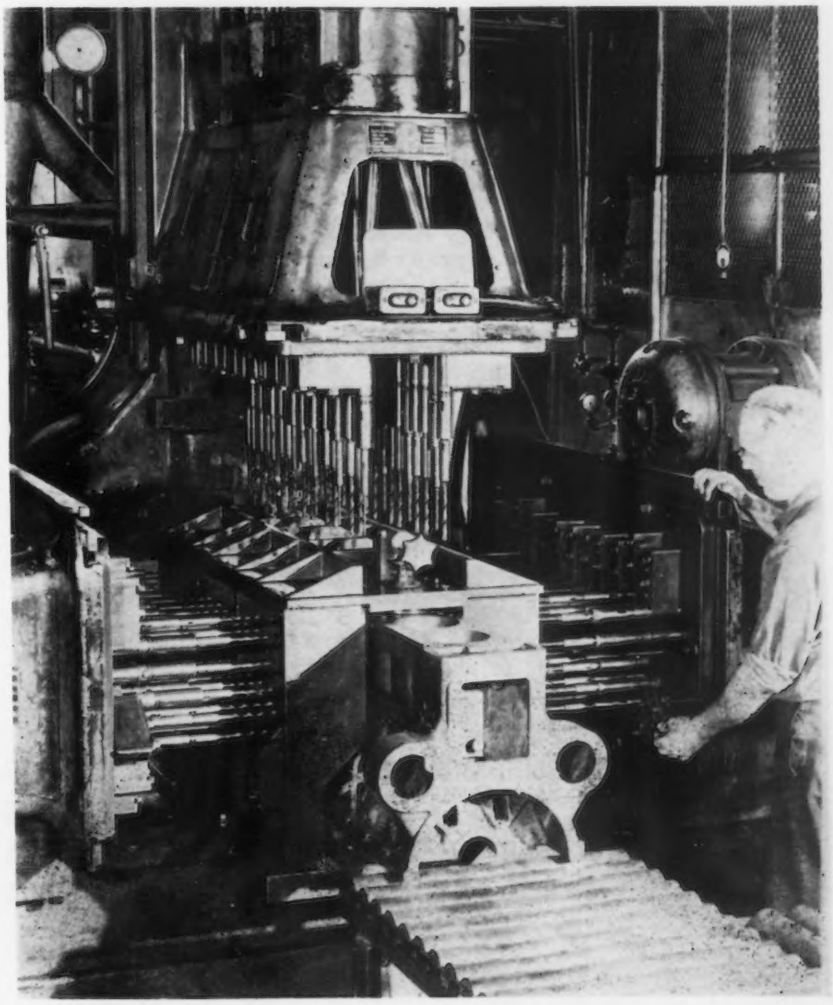
NE 8635	NE 8642
NE 8637	NE 8645
NE 8640	NE 8650

The manganese content of those steels is 0.75 to 1.00 per cent.

The nickel content of all remaining NE 8600 series steels has been changed to read 0.40 to 0.70 per cent, an increase of 10 points in the upper limit. The nickel content of NE 8720, the only remaining 8700 series steel, has been revised to read 0.40 to 0.70 per cent; likewise an increase of 10 points in the upper limit.

In the same manner the nickel content of the NE 9400 series steels has been changed to read 0.20 to 0.50 per cent and the NE 9500 series has been changed to read 0.40 to 0.70 per cent nickel; in both cases an increase of 0.10 per cent in the upper limit.

SUPER-DRILLER: This efficient machine is helping Hudson Motor Car Co., Detroit, turn out the big Invader engine being built for the Navy. The machine drills more than 100 holes on three sides of the engine's cylinder block at the touch of a button and a twin machine taps the holes with equal speed. More cylinder blocks are drilled and tapped in an hour with these machines than could be handled in a full day with old type equipment, the company states.



The Answer to a Foreman's Prayer

This is a valve part . . . used in aircraft instruments. The foreman in charge of its production had a fairly happy lot—until nickel hit the "critical" list.

This particular piece was made of alloy steel, rich in nickel. Came a recent day, however, when the specified steel became as scarce as coffee. It looked like production quotas were due to start skidding.

Putting the problem up to Frasse, the foreman substituted, as per recommendation, a more plentiful low-nickel emergency steel—NE 8620. The only wrinkles—slight changes in machining and tempering—were quickly ironed out, leaving hardly a ripple in the production schedule. Trouble hasn't reared its head since.

Frasse technical representatives have been gathering such operating data on the new emergency steels for months. If you are still in the contemplating stage, or have struck a "bug" in changing over, Frasse engineers will be glad to pitch in. Their advice is gratis. Just write or call: *Peter A. Frasse and Co., Inc., Grand Street at Sixth Avenue, New York, N. Y. (Walker 5-2200)* • *3911 Wissahickon Avenue, Philadelphia, Pa. (Radcliff 7100-Park 5541)* • *50 Exchange Street, Buffalo, N. Y. (Washington 2000)* • *Jersey City, Hartford, Rochester, Syracuse.*

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STEELS

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COLD FINISHED BARS • WELDED STEEL TUBING
STAINLESS STEELS AND TUBING • AIRCRAFT STEELS
COLD ROLLED STRIP AND SHEETS • ALLOY STEELS

Nickel Co. Expansion In Canada Completed

Toronto

• • • **International Nickel Co.** of Canada, Ltd., has completed its $35,000,000 expansion program and is going into operation with its enlarged production facilities. This enlargement program, underway for more than a year, enables the company to handle a total of 35,000 tons of ore daily and it is believed under pressure 40,000 tons daily may be treated. The enlargements also will add 50,000,000 lb. of nickel to the 1940 total as well as about 75,000,000 lb. of copper a year. While Nickel executives now are primarily concerned with the tremendous wartime demand for nickel, copper and platinum, they are beginning to look ahead to postwar requirements. Present plants appear to be much greater than will be required immediately after the conclusion of the war, when a slowing down in demand for nickel, copper and platinum may be expected.

As the result of the heavy demand for nickel and copper, International Nickel has been forced to draw heavily upon the high grade ore deposits from the Frood and Creighton mines, with the result that for peacetime production the company may have to depend largely upon its lower grade ores. Under the program which calls for step up to 35,000 tons per day the average nickel-copper content of the millfeed will be definitely lower. Ores that five years ago were considered to be sub-grade or marginal, now classify as ore reserves. There are many millions of tons of this low grade material indicated by drilling and otherwise known to exist on International Nickel properties in Sudbury.

With regard to Nickel's latest expansion program, President Stanley intimated that it is chiefly a war project. He said: "Experience leads to the belief that our augmented productive capacity will be far in excess of industrial requirements of the world after the war." However, industry in general has gained far greater knowledge of the characteristics of nickel, which should assure the continued use of the metal in a multitude of engineering applica-

tions. The superior qualities inherent in the various types of nickel-bearing steels and alloys have been brought home to thousands of manufacturers of war equipment, and as a consequence much greater demand for nickel is expected to result from this educational policy.

International Nickel's expansion program, now nearing completion, embraces enlargement of open-pit operations at the Frood and adjoining Stobie mine, the expansion of the Garson, the opening of new underground workings at the Murray and Stobie and enlargements of operations at the Frood, Creighton and Levack mines.

It is generally believed that in the future International Nickel will have to depend more and more upon its low grade ore resources. These resources are very large and after the war it is quite possible that the company will show ore reserves much larger than the prewar figures of 204,000,000 tons.

International Nickel has obtained sufficient labor to take care of the added production capacity, and there is a better feeling among workers. Also the number of women employed has been greatly increased. There are now 500 women workers at the Sudbury plant and 125 at the Port Colborne Refinery on plant jobs.

UNDER NEW NAME: E. E. Aldous (above), president of Scully Steel Products Co., U. S. Steel subsidiary, has announced that the company's name will be changed to United States Steel Supply Co. on Jan. 1, 1943.

ROEBLING *Wires*

ROUND . . . FLAT . . . SHAPED

A FEW WIRES TYPICAL OF ROEBLING'S BROAD SPECIALTY PRODUCTION

Extreme Accuracy

THAT MEANS RECORD-BREAKING PRODUCTION AND PERFORMANCE!

ROUND WIRE TO SPECIFICATIONS

SHAPED WIRES

FLAT WIRE FOR FEELER GAUGES ROLLED TO .0015"

HERE'S one of those tremendous trifles that makes possible record-breaking mass production of plane and tank engines, guns and other ordnance equipment.

It's Roebling high carbon flat wire for feeler gauges . . . *finished to .0015"* and clean as a whistle. That's because it starts with steel from our own mills where we can carefully select each melt for proper carbon content and steel analysis. Then it's rolled, tempered and polished on custom production facilities . . . with the know-how and close attention to detail that this work requires. And it goes into action immediately because it requires no further treatment in the customer's plant.

If special round, flat or shaped wires can do a job for you, call on Roebling's long experience in meeting exacting standards of steel analysis, grain structure, dimensions and finish. We're ready and able to go to work on your problem. Prompt action on war orders.

ARMY E NAVY

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JOHN A. ROEBLING'S SONS COMPANY

TRENTON, NEW JERSEY — Branches and Warehouses in Principal Cities

GIVING 'EM *More* TO WORK WITH!

Awarded the Navy "E" for excellence in war production, P&H displays it also as a pledge of future effort.

P&H ZIP-LIFT
HARNISCHFEGER CORP. MILWAUKEE, WIS.

CAPACITIES: 250, 500, 1,000 and 2,000 pounds

GETTING more "working tools" to battle-fronts — *faster* — that's the job for P&H Zip-Lifts in war plants today. These handy little electric hoists are speeding up materials handling along production lines — in store rooms — on loading platforms, etc. They're supplementing man-power and relieving worker fatigue so that both men and machines can produce more.

With bolt, hook, or trolley mounting — the P&H Zip-Lift is ready to go to work in a hurry, *anywhere*. Just hang it up and plug into any standard lighting circuit. Full magnetic push-button control makes it safer, easier to operate. It's the quality hoist in the low price field. Literature available on request.

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HOISTS • WELDING ELECTRODES • MOTORS P&H EXCAVATORS • ELECTRIC CRANES • ARC WELDERS

Auto Carriers Used For Transporting Guns

• • • When new automobile production ceased, the trailer trucks used to ship cars from manufacturing points to sales rooms throughout the country were considered to be useless equipment in the hands of transfer companies. One transfer company in Ohio, however, got on the job and with few changes in the existing trailers has been using them to carry field guns from producers' plants to points of distribution. Three field pieces are loaded on the trailer and, like the automobile, the guns are shipped to distributing points. In transit, the pieces are covered carefully with tarpaulin to prevent damage by the weather and to prevent the "too interested" from seeing them.

Koppers United Seeks Men For New Butadiene Plant

Pittsburgh

• • • **What has been** currently known for several months was publicly disclosed here last week when the Koppers United Co. advertised for more than 1000 skilled workers to help build one of the largest plants in the country for synthetic rubber raw materials. According to the job specifications, the butadiene plant will be located at Kobuta (a new town) near Monaca, Beaver County, Pa.

Koppers Co. officials had little to say on the subject except "We can't tell you how big Kobuta is but it is one of the biggest plants that will supply materials for synthetic rubber. For months bulldozers, drag lines and concrete mixers have worked day and night preparing the site and sinking the foundations. Now it's time for big scale construction to get moving at top speed."

William C. Glynn Heads WPB Transportation Section

Washington

• • • **William C. Glynn,** Philadelphia, was appointed last week as chief of the newly formed transportation section of the WPB containers' division and will work out details for conservation of transportation and distribution facilities within the container industry. Mr. Glynn recently retired as assistant freight traffic manager of the Pennsylvania Railroad.

17 Companies Appear Before WPB Compliance Division

Cleveland

• • • **The regional** WPB Compliance Division here recently summoned representatives of 17 Ohio, Michigan and Pennsylvania companies to appear for compliance conferences on which the possibility of production suspension orders will rest. This was the greatest number of compliance hearings to be held in a single week since the regional division was established and required the services of an extra commissioner and an attorney from Washington to help in the work.

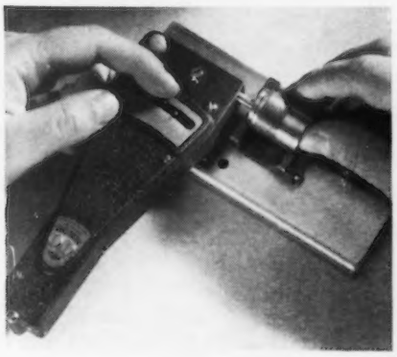
Three commissioners are holding these hearings this week. Walter Foster, chief of the compliance commissioners from Washington, will be in the region, assisting two Cleveland commissioners, Wayne Townsend of Western Reserve University, and Judge Daniel Morgan. The regional compliance division announced five suspension orders in the last week of November and has 18 more pending. The present conferences have to do with alleged violations on steel, copper, building, and plumbing supplies, under PRP.

Stratton Quits WPB Position

Washington

• • • **Samuel S. Stratton,** director of the review division in the WPB Distribution Bureau, resigned last week and has accepted the presidency of Middlebury College, Middlebury, Vt.

GAGE READS IN BRAILLE: This inspection gage of comparator type recently developed by the Trico Products Corp., Buffalo, can be accurately operated by a blind person as it can be read by feel. The indicators protrude through a slot and can be read with the fingers. The device, known as the Micro-Chek, is furnished for split-thousandth reading in a standard visual type.



We can make it for you—now!

CHARLES C. DOYLE
President

I have a story to tell to the executives of big companies who want to get more production, or some special type of production, ***FAST.*** This is no pipe dream. This is what we have done, and are doing today, for some of the important prime contractors. We have made aircraft parts, gun sight parts, tank parts, landing gear parts and subassemblies, just to name a few.

The WPB people call our operation a Vertical Pool. We were about the first successful large scale operation of this kind, starting long before Pearl Harbor. The members of our group are thoroughly experienced and dependable. They include many small shops where the owners are skilled operators working on their own machines, and some large plants that have specialized facilities available from time to time.

And please get this straight—The J. E. Doyle Company is not a middleman performing simply a selling function. We have a skilled production and engineering staff which provides the technical and supervisory know-how that most of these small shops lack. We do the "paper work" which they are not set up to do themselves. We see that they are provided with the necessary tools, jigs and fixtures. We take the responsibility for results.

We are not price cutters, but our costs are amazingly low. The work is allocated to the various shops according to their ability to do the job ***satisfactorily, immediately*** and at a ***reasonable profit*** to themselves.

The essence of our service is ***SPEED.*** Give us the job today and we'll start turning it out tomorrow. I mean that literally. That's the one thing that everyone says is most important and yet I find it the hardest to get across to prime contractors. They just can't understand how we can move so fast.

That's why we are taking this means of telling our story. Some of you big executives will have the imagination to see in this Smaller Business Pool operation the answer to your production bottlenecks. We'll gladly furnish references.

Phone, wire or write today.

Charles C. Doyle

VICTORY POOL No. 1 OPERATING THROUGH

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Pool Facilities Include: Machining, Metal Fabrication, Welding and Brazing, Plating, Aluminum and Bronze Castings, Precision Instruments, Electrical Heating Elements, Complete Assemblies

What is tougher than tough?

Sounds like the poser the physics professor puts to his class, "If an irresistible force meets an immovable body, what happens?" Only this one is simpler.

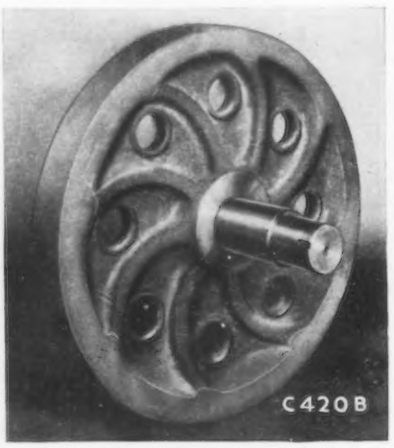
Malleable iron, as ferrous metals go, is "tough" in the sense that it is ductile and will bend before breaking. But real toughness is more than mere ductility — it's the *combination* of high ultimate strength (125,000 pounds in a machined 13% manganese steel test bar), plus a low yield strength (40,000 pounds) and a high elongation (50%) before fracture.

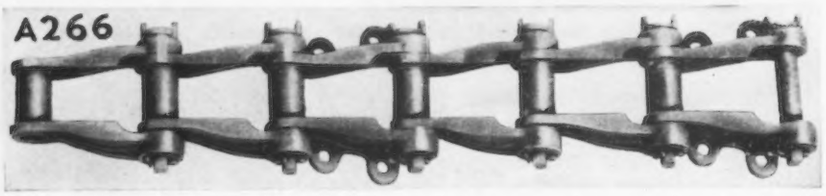
Their toughness alone would qualify austenitic manganese steel castings for many of the strenuous duties they discharge, but they have another invaluable property. More than any other steel, they increase in hardness on the wearing surfaces under repeated impacts and pressure; to as much as 550 Brinell in the severest service.

You have, then, a combination of properties in genuine manganese steel that enables a conveyor chain, sprocket, gear, sheave or wheel to stand up under destructive stresses and at the same time to resist the attrition of abrasive materials. No wonder "The Toughest Steel Known" often lasts ten times as long as ordinary ferrous metals!

The surface hardness induced by cold-working is self-renewing, so long as the service continues—as the hard skin wears away, another develops without affecting the toughness of the body metal. Accordingly, a properly applied manganese steel casting retains its useful properties to the end—and it *does* wear out at last.

So the answer to "What is tougher than tough?" is tough-hard manganese steel — and it's also the answer to innumerable equipment maintenance problems. Catalog 59 will give you 64 pages of facts and pictures concerning "The Toughest Steel Known."





Copper mold machine track wheel (C420B) with pressed-in trunnions and one of many types of manganese steel conveyor chain (A266).

If we lose the war, the victor will seize your scrap in a hurry!

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AMERICAN MANGANESE STEEL DIVISION
OF THE AMERICAN BRAKE SHOE & FOUNDRY CO.
Chicago Heights, Illinois

Genuine Manganese Steel, "The Toughest Steel Known"
Chromium-Nickel Alloy Castings for heat and corrosion
Power Shovel Dippers. Dredge and Industrial Pumps
Welding Materials for reclamation and hard-surfacing

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OFFICES IN PRINCIPAL CITIES

Iron and Steel Output in Canada Shows October Rise

Toronto

• • • **Canada's** iron and steel production rose sharply in October, with iron output at 100 per cent and steel at approximately 99 per cent of capacity. All 12 blast furnaces continued blowing with average daily production of 5659 tons against 5197 tons in September while the daily average output of steel was 8746 tons compared with 8164 tons in the previous month, according to figures by the Dominion Bureau of Statistics.

Pig iron production attained the all-time high monthly record of 175,424 net tons compared with 155,900 tons in September and 153,568 tons in October last year. For the month under review output included 148,761 tons of basic iron, 12,761 tons of foundry iron and 13,902 tons of malleable iron. All the foundry and malleable iron and 8020 tons of basic were made for sale.

For the 10 months ending Oct. 31, pig iron output topped all previous records for a like period, totalling 1,640,055 net tons compared with 1,212,089 tons in the same period last year and 1,057,702 tons in 1940.

Blast furnace charges for October included 322,128 tons of iron ore and 10,941 tons of scrap iron and steel, compared with 293,630 tons ore and 9534 tons of scrap in September.

Production of ferro-alloys in October at 18,266 tons compares with 18,548 tons in September and 18,826 tons in October, 1941. For the 10 months this year ferro-alloys made the high record of 177,336 net tons compared with 174,105 tons in the same period of 1941 and 118,004 tons in 1940.

Steel ingots and castings in October at 271,127 net tons, were just slightly under the peak record of 272,247 tons made in May this year, and compared with 244,922 tons for September and 249,595 tons in October, 1941. For the month under review output included 254,887 tons of steel ingots and 16,240 tons of castings.

For the 10 months ending with October, production of steel ingots and castings made the all time high record of 2,579,715 net tons compared with 2,208,535 tons for the same period of 1941, and 1,847,293 tons in 1940.

Labor Shortages Being Met; Steel Outlook Better in Canada

Toronto

• • • **C. D. Howe,** minister of munitions and supply, stated that in Canada industrial labor shortages are being met and the outlook for steel supply has brightened in the past three months. Mr. Howe stated:

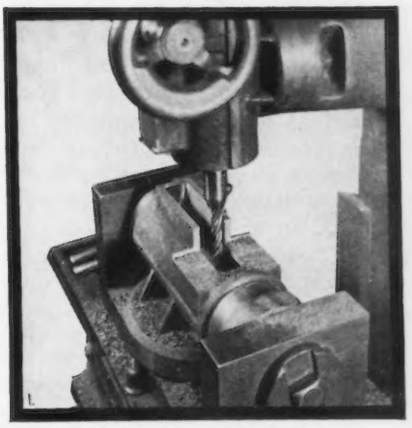
"Selective Service has functioned and is functioning to correct labor shortages in industry with the result that shortages that seemed serious two or three months ago now have been corrected. Compared with any of her allies, Canada's war machine is simple and effective and the method of organization followed in this country has been widely praised and extensively copied. The period of scarcity will pass and with the passing the controllers will disappear. They will leave behind them new industrial developments, added sources of supply and better organized industries.

"As the result of rigid control, we have been able to take care of essential steel. requirements. I think it can be said now that we will have sufficient steel to carry out all our programs, but I would not have dared to make this statement two months ago. In the expansion of Canada's steel industry the most spectacular development has been in alloy steels, where the output has been multiplied more than six times, making Canada practically self-sustaining in alloy steel of types used for guns, armor plate and machine tools."

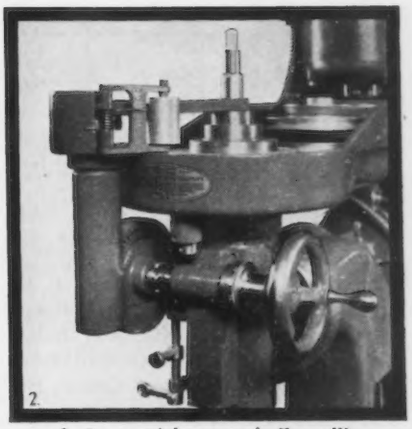
Canada's Ship Building Reaches $900 Million

Ottawa

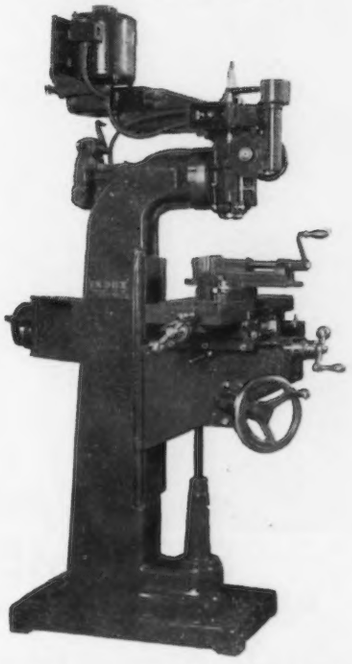
• • • **Canada now is rated** as a foremost shipbuilding nation, its ship construction program having increased by 20 per cent during the past three months and now estimates expenditure of $900,000,000, C. D. Howe, Minister of Munitions and Supply, announced. Since the beginning of the war Canada has launched nearly 300 combat ships, including corvettes, minesweepers, patrol boats, base ships and other vessels, and scores of cargo vessels have slipped down the ways. Approximately 1100 smaller craft, ranging from lifeboats to motor torpedo boats, have been launched.

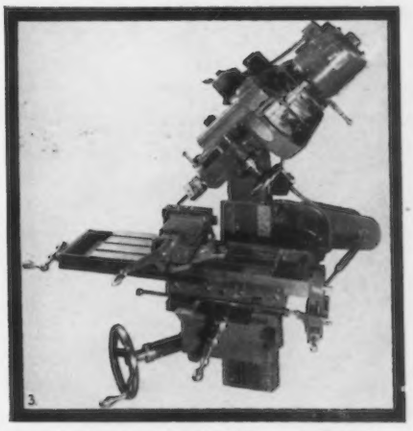


1. Precision end-milling



2. Power drive to spindle quill





3. Head swivels 90° each way

40-H INDEX

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INDEX MACHINE & TOOL COMPANY

A SIMPLE AND PRACTICAL MACHINE FOR APPROXIMATELY $1000.00

That was the original idea of the Index Machine & Tool Company in bringing out the 40-H INDEX.

Rugged and fast for its class. Designed to do end mill work with end mills from ⅛" to ⅝" in tool steel. With a spindle running in super precision pre-loaded ball bearings . . . with verniers for locating . . . with power feed to spindle for boring.

This has now long been an accomplishment, TRIED & PROVEN by hundreds of Defense Plants on parts for all kinds of war equipment from binoculars to battleships.

If you do not know about this machine you should write at once for full particulars from

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BLANK & BUXTON MACHINERY COMPANY

3100 E. MICHIGAN AVE. JACKSON, MICHIGAN

40-H INDEX

A Tried and Proven Machine for Milling, Drilling and Boring in the Tool, Die, Experimental and Production Shops

Canadian Manpower On Priority System

Ottawa

• • • **Canadian industries** have been given a labor priority rating, and government officials now are engaged in preparing ratings for Canadian firms which fall in an in-between category. The ratings were prepared by National Selective Service, after consultations with the Department of Labor, Department of Munitions and Supply and the Wartime Prices and Trade Board. All Canadian industry has been placed in one of four categories, A, for top priority, B, for high priority, C, for low priority and D, for no priority.

"A" category firms are those on Department of Munitions and Supply essential list, industries most essential to war work and essential at approximately current rate of production for civilian efficiency. "B" category firms are those important to war work or essential to civilian life and efficiency. "C" category firms are those that are important to civilian life and efficiency. "D" category firms are those that are considered as non-essential.

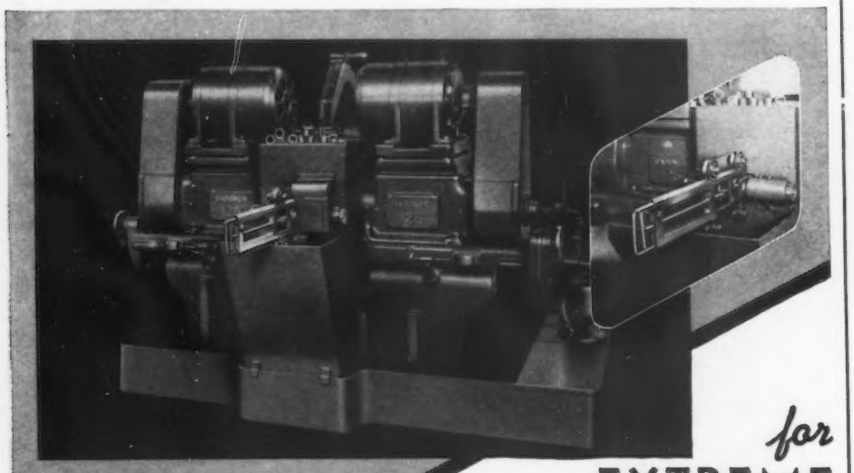
A partial list showing new ratings follows:

"A"-rating, mining, quarrying and digging iron ores; nonferrous metallic ores, (except gold); coal, natural gas and petroleum; mica, peat for production of magnesium, manganese, fluorspar, radium and salts, uranium, tungsten, dolomite for manufacture of magnesium. War production such as shipbuilding, aircraft and ordnance, iron and steel manufacture, ferro-alloys, scrap collection, automotive transport, electrical, metal working and mining machinery, aluminum production and all metal smelting and refining.

"B"-rating:—Other non-ferrous metals not in "A" group; other iron and steel products; non-metallic minerals; building glass, abrasives; electrical goods for civilian uses, and many other items.

"C" rating:—Newspaper printing and publishing; clothing, household furniture, and many other articles.

"D" rating:—Includes lace and embroidery, mats and rugs, artificial flowers, and a wide variety of similar articles, including many products from paper, etc.



for EXTREME ACCURACY— but *moderate* production

YOU don't have to take on a high-production job before you can reap the full benefit of Gardner PRECISION Grinding.

For modern Gardner Double Grinders are turning in great accuracy records when equipped with Hand-operated fixtures for moderate production. In fact, these machines are identical with the better-known high-production tools, except in the type of fixturing.

HERE is an excellent example, representative of many.

Steel spacing collars, measuring 1⅛" to 1¾" O.D., and ⅞" maximum length, are ground at the rate of 6 TO 8 PER MINUTE on this Gardner No. 125—23" PRECISION Grinder, using a roller gun-type sliding fixture. Tolerances: .0002" to .0005" for parallelism, and ±.002" for uniformity, based upon .008" to .010" maximum overall stock removal.

Purely hand-operated, but you get EXTREME ACCURACY, with good production.

WRITE FOR DETAILS!

GARDNER MACHINE COMPANY
412 East Gardner Street • • • Beloit, Wisconsin, U. S. A.

Silver Process Patented By Canadian Inventor

Toronto

• • • **Alfred D. Slatkin,** a Canadian born inventor, has patented a new process which yields "a substitute for tin." Associated with Mr. Slatkin in this new enterprise is Arthur F. Cutten, Toronto businessman. Described in the patent as the "Industrial Silver Impregnation Process," the discovery has aroused considerable interest in Canada and the United States. The process is said to have passed exhaustive tests without a kink having been revealed. Reduced to simple terms the process is an electro-chemical one and uses silver instead of tin. There is no plating required.

In describing his process, Mr. Slatkin stated it places the silver in the steel, instead of on the surface, thereby creating an unbreakable combination of two elements.

"What I have done with silver, I can also do with other metals such as chromium, nickel and gold," Mr. Slatkin stated. "We are concentrating on tin substitute because our chief supply of tin has been cut off by the Japs. There are two basic materials used in my processes, silver and iron, and both are mined and produced in abundance in this country. The process combines the

two to form a tin-plate substitute. It has highly important values because of its impregnating qualities, and I believe it will revolutionize the plating industry as a whole. Briefly, it is a new method of combining metals, resulting in cold alloying of one element to another through an electro-chemical process. The prevailing process is to deposit elements on the surface of metal, mine is disposition of elements in the metal."

$1 Billion Spent on Canadian Industry

Toronto

• • • **Canada has built** new industrial capacity to a value of more than $1,000,000,000, C. D. Howe, Minister of Munitions and Supply, announced. After the war, peacetime uses will require about 90 per cent of this enlarged manufacturing capacity. Of this new production capacity approximately $500,000,000 was expended on direct war plants.

For the production of primary metals, iron, steel, aluminum, nickel, copper, and various alloys, expenditures have reached a total of approximately $300,000,000, mostly provided by government assistance by Canada, Great Britain and the United States.

In the steel industry productive capacity over 1939 has been more than doubled at a cost of $100,000,000. Enlargements to nickel production represent expenditures of more than $30,000,000, and about $65,000,000 has been spent for enlargement to aluminum production capacity.

Mr. Howe stated that somewhere in the wilderness of Canada, a hydroelectric power development project is underway that will overshadow the great Boulder Dam in the United States.

DPC Contracts Let

Washington

• • • **Defense Plant Corp.,** RFC subsidiary, has authorized the following contracts:

Eastern States Petroleum Co., Inc., New York, to provide machinery and equipment in a plant in Texas at a cost in excess of $1,500,000.

International Business Machines Corp., New York, to provide machinery and equipment in a plant in New York at a cost in excess of $1,000,000.

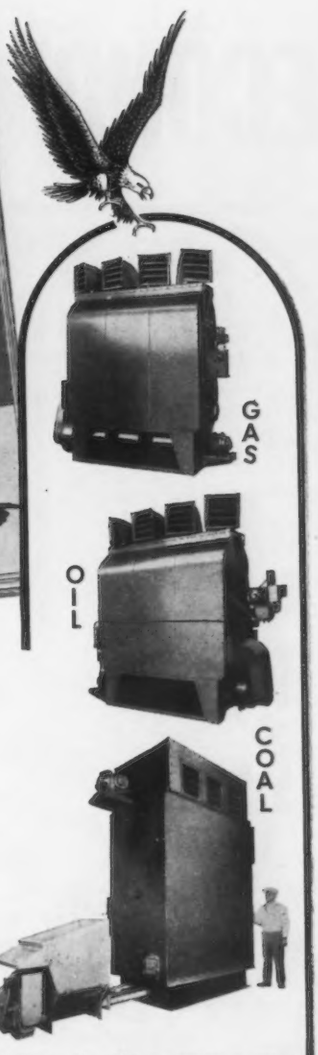
Cornell-Dubilier Electric Corp., South Plainfield, N. J., to provide additional facilities in a plant in Massachusetts at a cost in excess of $250,000.

Foundrymen Announce Annual Apprentice Competition

Chicago

• • • **The apprentice** molding and patternmaking contests of the American Foundrymen's Association, which have been sponsored annually by the aprentice training committee, will again be held in 1943, with four groups of competitions: gray iron molding, non-ferrous molding, steel molding and pattern making.

Any foundry or pattern shop manager may receive copies of the regulations and the blueprints or patterns by writing to the Secretary, Apprentice Contest, American Foundrymen's Association, 222 West Adams Street, Chicago.



NINE QUICK FACTS FROM THIS NEW BOOKLET

1. By eliminating the need for a boiler plant, these heaters save critical materials, man-hours and money.
2. Dravo Direct Fired Heaters give instant heat when the starter button is pushed.
3. Maximum heat utilization is secured from fuel. All heat except stack loss is utilized.
4. The most economical fuel available for automatic firing, natural gas, light or heavy fuel oil, or coal, is used.
5. Lower maintenace cost due to simplification, such as eliminating freeze-ups, broken traps, leaking valves, etc. No moisture from steam leaks to rust material stored in heated areas.
6. Saving in labor costs; can be operated by maintenance man.
7. The system can be used to furnish summer air circulation. Arrangements can easily be made to provide outside fresh air. Filters can be installed on air intakes.
8. Heat is delivered over an entire floor area or to a localized section with minimum temperature differential between floor and ceiling.
9. These heaters can be installed during building construction for temporary heat. Very little labor is required for their installation.

Bulletin No. 506 contains a complete description of design and construction of Dravo Direct Fired Heaters for gas, oil or coal; also tabular comparisons showing metal and fuel savings which contribute to the war effort. Send for your copy.

DRAVO CORPORATION

Heater Department

DRAVO BLDG., PITTSBURGH, PA.

Sales Offices in Principal Cities

Steel Union Claims 725,000 Members in 903 Companies

• • • **At the close of 1942** the USA-CIO reports that it has 903 companies under contract. Within these 903 companies, 725,000 men were paid-up members. Since the decision of the War Labor Board in the "Little Steel" case, which granted a maintenance of membership clause and the check-off to the steelworkers, almost all of the contracts that have been renegotiated between the union and the companies in the iron and steel industry have included these clauses. At year end it is estimated that approximately 90 per cent of the CIO-United Steel Workers members are now covered by maintenance of membership clause and the check-off.

The UAW-CIO reports having 1328 companies under contract and a total membership of 898,860. When questioned about the maintenance of membership clause in these contracts, they estimate that they have been granted in at least 45 per cent of the cases. About 15 per cent of the contracts grant the check-off.

The Electrical Workers have 810 companies under contract with a total membership of 435,000. Approximately 46 per cent of the contracts include maintenance of membership. The number containing the check-off rights was not known.

These three unions within the CIO thus have controlling contracts in 3041 companies and guide the working futures of well over 2-million workmen. With the gradual acceptance of women into the unions this total can be expected to grow by leaps and bounds again.

Since shortly after Pearl Harbor, when the unions gave their pledge of abstinence from striking to the President, the CIO says it has not authorized a single strike. In spite of this a number of work stoppages have occurred without union sanction.

To support claims that the CIO has been active in heading off work stoppages by seeking WLB decisions to satisfy irate workers, the CIO general headquarters estimates that 75 per cent of all cases on the WLB dockets originated from the CIO.

ECONOMIZE ON ZINC

with

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PROCESS

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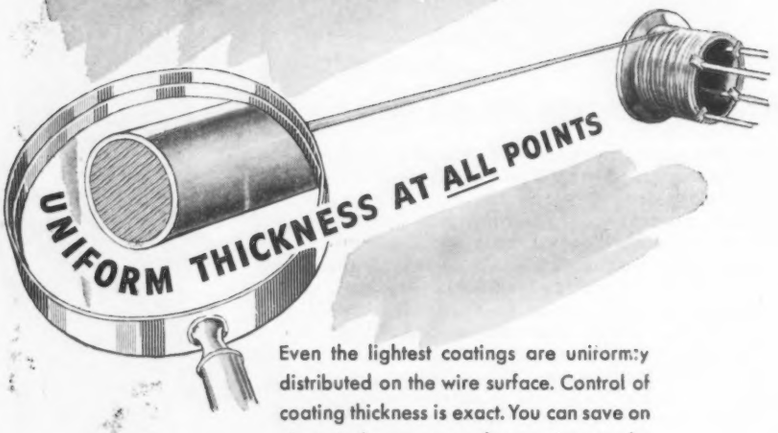

Even the lightest coatings are uniformly distributed on the wire surface. Control of coating thickness is exact. You can save on zinc, produce more perfect coatings, make more profit with Meaker Process for Electro-Galvanizing Wire.

"A proven success by every test"

WE INVITE YOUR INQUIRY

The MEAKER Company

1635 South 55th Avenue, Chicago

Nelson Asks Work On New Year's Day

• • • **Chairman Donald M. Nelson** of the War Production Board has announced that war production factories would be expected to observe normal working schedules on New Year's Day.

"Ever since Pearl Harbor, we have asked workers and management in war plants to forego their customary holidays in order to maintain unbroken production schedules," Mr. Nelson said. The one exception that has been made to this rule during the past year has been in connection with the observance of Christmas.

Lincoln Electric Rewards Workers for High Production

Cleveland

• • • **An outstanding** production record of over $30,000 per worker was recognized here Dec. 19 by the Lincoln Electric Co., in the payment of nearly $3,000,000 to its workers.

J. F. Lincoln, president of the company, released the following statement:

"It is obvious that our only chance for success in this war is the American workman's ability with American methods to produce war equipment more rapidly than can our enemies. If this hope is made a reality, success is assured. If it is merely a hope, we are already defeated.

"A proper incentive wage system to boost the output of all types of labor has in our case, met with unusual success. In carrying out this yearly policy, the Lincoln Electric Co., on Dec. 19, will make a payment covering unusual production by its employees of nearly three million dollars. This is for production records which have been so great that the total labor cost of the products made by the company, is much less than that of any other manufacturer making a comparable product.

"As an illustration of this, the average yearly production per man in other manufacturing plants is between $4,000 and $10,000. The production this year of the Lincoln worker will exceed $30,000 per man.

"The range of the Lincoln incentive payment is from $10 to $25,000, depending upon the responsibility and productive ability displayed by the individual through the year. This is calculated on the same basis as the payments made in previous years. The only workers in the Lincoln organization who do not participate in this payment are the president and the chairman of the board. This incentive is distributed approximately 90 per cent to the shop and office workers and 10 per cent to management."

Prospecting Started For Flake Graphite

Tuscaloosa, Ala.

• • • **Because of the** war-occasioned scarcity of flake graphite for use in foundry work and the steel industry, prospecting for new deposits is being carried on in a tri-county area in Eastern Alabama, according to Richard W. Smith, acting district engineer for the U. S. Bureau of Mines at the University of Alabama.

Prospecting crews will begin work in Clay, Chilton and Coosa Counties as soon as a sample testing laboratory is set up at Ashland in Clay County.

Acme Gives Christmas Checks

Chicago

• • • **Christmas checks** totalling more than $235,000 will be distributed this week to 3000 plant and office workers of Acme Steel Co., according to an announcement by Charles S. Traer, president. Similarly remembered will be the more than 400 Acme employees now in the armed services in all parts of the world.

PRESSED COLD by PARISH In 4000 ton Press

The method best suited for each particular stamping—to insure most effective results, most efficient production and most modest cost—is employed when you present your problems to the Parish plant.

Equipped to handle all types of work in all methods and sizes of stamping, our plant is able to meet your specifications in all its elements, including the factor of time.

Illustrated is a Spring Plank for railroad freight car trucks. Made of 7/16" metal—16⅝" wide at ends, 14¼" wide at center and 93¼" long with flanges 3⅜" high at center, 2 3/16" high at ends—it was pressed cold from heavy steel.

The submission of your requirements for review involves you in no obligation.

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We have turned our facilities over entirely to the manufacture of various products required by the United States Government and American Railroads.

Steel Capacity Now Over 89 Million Tons, Nelson Report Shows

• • • **In 1943,** United States steel production will approach twice the combined output of the Axis Nations, according to a WPB release last week quoting WPB Chairman Donald M. Nelson.

Pointing out that combined steel production of Germany, Italy and Japan is estimated at 50,000,000 to 55,000,000 ingot tons annually, Mr. Nelson declared that this country's steel capacity already has increased to more than 89,000,000 tons, and on completion of the expansion program in mid-1943, will be approximately 97,000,000 tons. These figures compare with actual production in 1940 of only 67,000,000 ingot tons.

Alloy steel production has shown remarkable progress, he said. Production is now substantially in excess of 1,000,000 tons each month, and will increase further next year. The tonnages of alloy steel we are now producing are more than four times greater than the peace time peaks.

During the month of December, 1937, the American steel industry's production of all grades of steel ingots was less than 1,750,000 tons. During September, 1938, it amounted to only 3,000,000 ingot tons. Not until the start of war in Europe in 1939 did production start to climb.

"We can best evaluate the rapid strides made by the steel industry to catch up with the stockpiles the Germans were building while our steel production slumped," Mr. Nelson said, "when we see that on completion of the expansion program, our monthly output rate will be about 8,100,000 tons of ingots.

"This does not mean that there will not be difficulties here and there for one type of product or another. Nor does it mean that we are producing enough steel for less-essential civilian uses."

The way the expansion program shapes up is shown in the accompanying table, which lists raw materials required and ingot production facilities broken down into the three principal types.

The 8,100,000-ton monthly rate of ingot output to be reached in 1943 will produce about 5,780,000 tons of finished products per month.

The shifting pattern of production of certain types of finished products since the start of the war is shown below (figures for December, 1942, are estimated by WPB):

MONTHLY PRODUCTION (Tons)

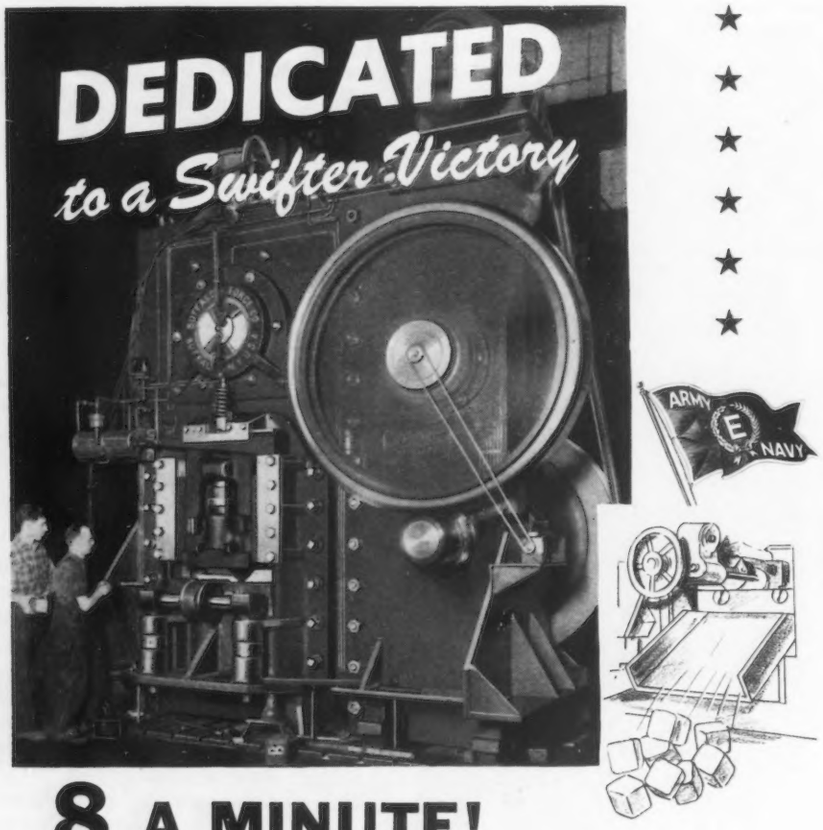
Product	Jan., 1942	Dec., 1942
Plates	750,000	1,110,000
Bars	1,050,000	950,000
Sheets and strip	1,150,000	830,000
Structural shapes	450,000	340,000
Rod and wire	450,000	350,000

The decrease in four of the five products shown above reflects the conversion of finishing facilities to the type of steel products needed in the war program.

IRON ORE (Net Tons, Annual Rate) (000 Omitted)

Source	Jan. 1, 1942	Dec. 1, 1942	Goal of Present Program*
Texas & Mo.	22	56	896
Foreign	2,312	530	.....
Eastern	3,696	4,144	6,160
Western	1,568	1,624	4,144
Southern	9,408	10,416	10,640
Lakes	101,577	104,621	112,109
Total	118,583	121,391	133,949

*Estimated.



8 A MINUTE!

That's the rate this giant shear cuts billets for husky shells

This mammoth Buffalo Billet Shear typifies Industry's determination to win—and win fast. At a fast clip—with knives under a pressure of 3½ million pounds—this Buffalo Shear cuts off alloy steel billets for Victory shells. It's a tough assignment, yet the massive construction and simplicity of operation of the Buffalo Shear makes easy, accurate work of it . . . Here is but one of many Buffalo Forge contributions to back up America's armed forces.

"Buffalo"
MACHINE TOOLS

BUFFALO FORGE COMPANY
492 BROADWAY BUFFALO, NEW YORK
Branch Engineering Offices in Principal Cities
CANADIAN BLOWER & FORGE CO., LTD., KITCHENER, ONT.

Consumption of iron ore is now running at a rate of 10,000,000 tons a month, and with iron ore shipping on the Great Lakes coming to a definite close for the season, the inventory on hand amounts to almost 60,000,000 tons.

Discussing coke, the report said as a result of two new plants which have been brought into production, and 17 additional plants which will be brought into production by July, 1943, total oven capacity will have been increased by 7,084,000 tons. Capacity comparisons are as follows:

Jan. 1, 1942	50,064,000 tons
Jan. 1, 1943	51,109,000 tons
July 31, 1943 (est.)	57,148,000 tons

At the end of the program, this will be supplemented by 14,292,000 tons from merchant by-product ovens and 9,000,000 tons from bee hive ovens.

Blast furnace capacity figures in the report were as follows:

Jan. 1, 1942	59,832,000 tons
Dec. 31, 1942	64,440,000 tons
June 1, 1943 (est.)	70,418,000 tons
Aug. 31, 1943 (est.)	70,850,000 tons

The expansion in blast furnace capacity, Jan. 1, 1942, to Aug. 31, 1943, amounts to 11,018,000 net tons. Of this figure,

New furnaces account for	8,253,000 tons
Rehabilitated furnaces	967,000 tons
Rebuilt & enlarged furnaces	1,007,000 tons
Improvement in equipment	791,000 tons

Total capacity of open-hearth furnaces was 77,702,000 tons at the end of 1941. Through the addition of new furnaces, enlargements of existing facilities, and as a result of more hot metal, the capacity in operation on completion of the program will have been increased by 7,640,000 tons.

Total planned capacity of 84,241,000 tons at the end of the expansion program, however, does not reflect this addition completely as a result of write-downs due to the increased production of alloy steels. When open-hearth furnaces produce alloy instead of carbon steel, some tonnage capacity is lost. Of the total expansion of 7,640,000 tons,

New furnaces account for	5,282,000 tons
Enlargements	634,000 tons
Hot metal	1,723,000 tons

Electric furnace capacity, important in the production of alloy steels, amounted to 3,402,000 tons at the beginning of 1942.

During this year, new facilities with a capacity of 970,000 tons have been added. Increases amounting to 294,000 tons, resulting from improved equipment and techniques, bring the total productive capacity at the end of 1942 to 4,666,000 tons.

Additional new facilities to be brought into production by June, 1943, will bring the total electric furnace capacity at the end of program to approximately 6,153,000 tons.

No expansion in the capacity of Bessemer convertors is planned. Capacity of these furnaces is 6,721,000 ingot tons annually.

Alloy steel, essential in the production of armor plate and machine tools, continues to show a steady gain in production. Production in 1938 averaged only 137,791 tons monthly. This rate doubled in 1939, and increased steadily thereafter.

The larger part of alloy steel production is in the open hearth. The tremendous gains in production can best be seen, therefore, by noting that electric furnace production of alloy steel alone in a recent month was more than twice the combined open hearth and electric furnace production in an average month of 1938.

Monthly Production of Alloy Steel

1938 average	137,791
1939 average	270,000
Jan., 1942	736,000
Dec., 1942	1,130,000
1943 average (est.)	1,230,000

RAW MATERIALS REQUIRED FOR PRODUCTIVE CAPACITY AVAILABLE AT COMPLETION OF EXPANSION PROGRAM (Net tons)

	Jan., 1942	Dec., 1942	Goal of Present Program*
Iron Ore	118,583,000	121,391,000	133,949,000
Coke	71,559,000	73,068,000	80,440,000
Limestone	29,300,000	30,780,000	34,716,000
Pig Iron	57,879,000	60,759,000	68,716,000
Recirculating Scrap Available	24,602,000	25,047,000	27,192,000
Purchased Scrap Needed	19,866,000	17,575,000	14,386,000
Productive Capacities			
Open Hearth	77,702,000	78,895,000	84,241,000
Bessemer	6,721,000	6,721,000	6,721,000
Electric	3,402,000	4,666,000	6,153,000
Total Steel Ingots	87,825,000	90,282,000	97,115,000

* Estimated.

2 Southern Forge Plants Make Their Millionth Shells

Birmingham

• • • **Workmen** in the shell forging plants of the Tennessee Coal, Iron & Railroad Co., at Ensley, yesterday delivered to the United States Army Ordnance Department the millionth 155-mm., as well as the millionth 75-mm. shell forging. The presentation was made during a visit to the plants by army ordnance and company officials.

The plant making the 75-mm. shell forgings was developed from a pilot plant and delivered the first forging on Aug. 1, 1941. The millionth shell to pass final inspection there came through at 4 a.m. on Dec. 14.

The 155-mm. shell forging plant delivered its first shell forging on Nov. 20 (Thanksgiving Day), 1941, and came through with the millionth shell forging at 10 p.m. on Dec. 15, 1942, only a few hours behind the record of the 75-mm. plant.

Structural Steel Bookings At Low Point in November

• • • **Efforts of** WPB to conserve the use of steel for more critical war purposes have shown their effect in the monthly booking reports of fabricated structural steel received by the American Institute of Steel Construction. New business booked during November amounted to but 45,972 tons, the lowest on record since the termination of World War I. Current operations, however, based upon orders previously booked hold up fairly well, the backlog of the industry being 566,581 tons on Dec. 1.

New orders booked during November were but little over one-third of the volume booked during the same month of 1941. Shipments of fabricated structural steel during November amounted to 127,052, representing a decline of 30 per cent from the volume shipped during the same month last year.

WLB Acts to Speed Pay Dispute Cases

Washington

• • • **Decentralization** by appointment of tri-partite panels in every major city to pass on wage increase disputes was inaugurated by WLB last week to speed the settlement of these actions and permit the national board to function as a type of supreme court.

Plans are under way to establish panels in all major cities composed of equal representation from the public, labor and management who will make recommendations on wage increase disputes to the tripartite regional board. The regional board is empowered to make decisions from which neither the employer nor the union would have the right to appeal. The WLB, however, reserves the right to review the decision on its own motion, or at the request of a regional director or an industry commission. Thus the WLB sets itself up as a supreme court of decision and clears itself and industry of much of the red tape and detail work otherwise inescapable.

The WLB also gave its regional directors power to render final decisions on all voluntary wage or salary adjustment cases involving employers of not more than 100 persons. This, it was said, comprised more than two thirds of the cases.

Work-Week Longer; Pay Rise Hits 4-Million

• • • **The average work week** in heavy industries engaged mainly in war work lengthened in October to 45.7 hr. compared with 44.6 hr. for September. All of the 49 durable goods industries reported increases in the number of hours worked and workers in 39 of these averaged more than 44 hr. a week. Average hourly wages which include overtime and incentive bonuses for the durable goods industries reached 98.8c. an hour and reflected a 16 per cent increase over a year ago.

Of the 39 industries averaging more than 44 hr. a week some typical war industries worked well over 50 hr. schedules. In the machine tool accessories 53.2 hr.; pump manufacture 50 hr.; machine tools 52.5 hr.; engine turbines 49.7 hr. and firearms 49.0 hr.

Between Oct. 16, 1941, and the same date this year, 4,400,000 workers received wage increases averaging 16 per cent. Of these workers at least two thirds were in the durable goods field; 46,000 in steel mills, 15,000 in electrical machinery plants, and 6000 in machine shops and manufacturing plants. These figures, while accurate for that period, are even higher now due to wage agreements recently made with Ford, Chrysler and G-M in the automotive field, a retroactive pay raise granted to workers of Jones & Laughlin Steel Corp. and increases granted in many other firms since October.

Twin Cities Freeze 175,000 Workers on Jobs

Minneapolis

• • • **About 175,000 essential** workers in the Twin Cities have been frozen in their jobs by action of the Area Committee of the War Manpower Commission. The commission adopted this move Dec. 21 as a means of smoothing the movement of skilled workers from non-essential to essential industries and to prevent pirating and migration of workers.

Under the terms of the action, workers will not be permitted to transfer from their jobs without a release from their employer or the United States Employment Service, the same method being applied in the Detroit area. Provisions are being made for the transfer of certain skilled workers to war work from non-essential industries and for the orderly movement of workers to most essential jobs. Arrangements are also being made for the importation of needed skills.

CIO Wins Poll for Bargaining at Sperry

• • • **The United Electrical,** Radio and Machine Workers of America (CIO) won the NLRB sponsored election to determine exclusive bargaining agents for the Sperry Gyroscope Co. held last week in their plants in Brooklyn and Nassau counties, New York. Out of 16,701 employees, only 9232 cast valid ballots of which 6564 voted for the CIO, 2210 for the AFL and 458 voted against union affiliation. The election followed an order from NLRB disestablishing an independent union in the plant.

Three New Ore Beds Revealed in Michigan

Lansing, Mich.

• • • **A new geologic study** of a portion of the Menominee range in the upper Michigan peninsula, prepared by Carl E. Dutton of the Department of Geography and Geology of Wayne University, reports 1942 investigations which revealed three areas where there are possibilities of high grade iron ore.

These localities lie in the vicinity of Quinnesec, Norway, and Loretto, Mich. Three other areas are outlined which "possibly merit some exploration."

The abstract of the report points out that while considerable information has been derived from explorations in the Upper, or Curry iron, formations, the development work has left practically untouched a lower, Traders iron, formation. At the six points described in the reports, earth faults have brought the Traders iron formation within mining distance of the surface.

100 Gasoline and Rubber Plants to Be Expedited

Washington

• • • **Pursuant to** an agreement between WPB and the Armed Services, WPB Director General for Operations Ernest Kanzler on Dec. 8 issued an order to facilitate the rapid construction of 100 octane gasoline and synthetic rubber plants. The order provides special directions which take precedence over nearly all WPB preference ratings, allocations and special production directives. Also, the order numbers the projects to indicate relative urgency.

Special directions supersede preference ratings including AAA, except if the AAA rating was received before the special direction and calls for delivery before Jan. 10, 1943. The PD-637 series remains, however, the highest powered aide to the procurement of material which WPB can issue. Special direction orders which bear lower project urgency numbers must, of course, give away to orders bearing higher urgency numbers.

The order, issued Dec. 8, has not as yet appeared in the Federal Register, where all government regulations are supposed to be printed, and has not been made the subject of a WPB press statement.

OPA Adopts Policy Concerning Price Relief in Certain Minerals

• • • **OPA on Dec. 24** announced broadening of the scope of price adjustment provisions for certain metals and other commodities. Among items affected are those on the WPB Group I substitute and supply list, including aluminum oxide, corundum ore, graphite, iridium, kyanite, tantalum, quartz crystals and others. The new provisions are effective Dec. 26 and are contained in amendment No. 3 to Supplementary Regulation No. 15 of the General Maximum Price Regulation. Copper, zinc or lead are not covered.

Price adjustments will be made on the basis of evidence showing either: (1) that a shortage exists or is threatened in the essential supply of a listed commodity and that the producer is unable to maintain or expand production at prevailing prices; (2) that a loss of production would force customers to resort to higher priced sources of supply.

The action marks a departure from OPA's announced policy of not permitting individual exception to price regulations. The OPA position now is that an increase in the individual price ceiling of the producer will not be inflationary in that the output does not go into consumer goods, and that furthermore the materials constitute only a small percentage of the cost of finished products.

•

Gray Iron Castings Prices

Washington

• • • **Sellers of** gray iron castings whose net sales during 1942 totaled $40,000 or less were excluded from price control on Dec. 21 by OPA. The effect, OPA said, is to free about 400 of the estimated 2000 commercial foundries in the country from the application of Price Regulation No. 244. The remaining 1600 foundries, however, do better than 98 per cent of the total volume of business.

The amendment also provides sellers with an alternate method for establishing maximum prices for castings not sold during the base period, extends the time for filing pricing methods and cost records and supplements the record-keeping requirements of the regulation. Excluded sellers must keep available records for OPA inspection of prices, costs, pricing methods, delivery charges, allowances and discounts on sales of products made during the period Aug. 1, 1941, to Feb. 1, 1943.

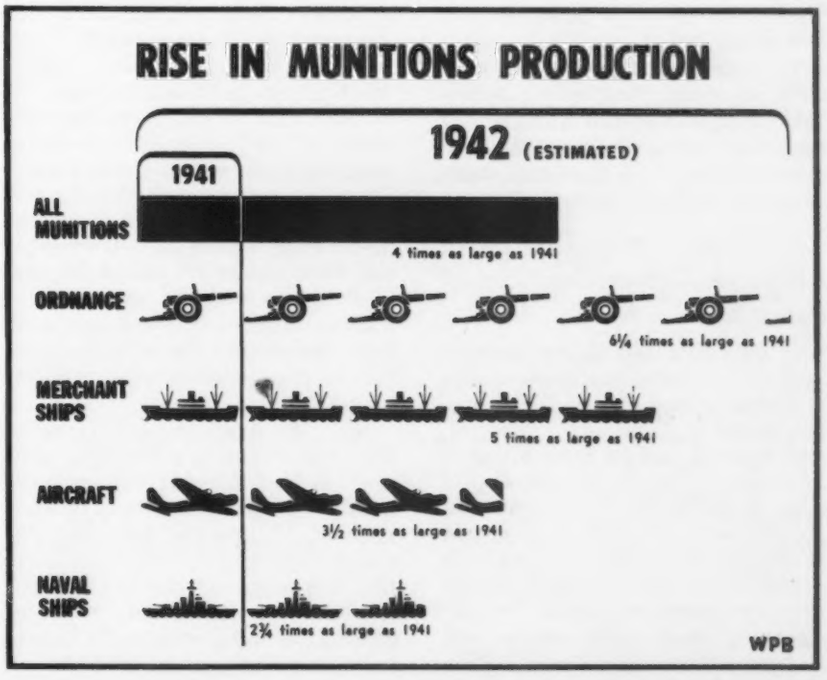
This class of seller must file with OPA regional offices on or before Jan. 15, 1943, a signed statement of total net sales during 1942 and thereafter must file quarterly statements of total net sales. If during any quarter net sales are greater than $12,500 the seller automatically becomes subject to all the provisions of Price Regulation No. 244 from the 15th day of the month following that quarter. A further provision permits any seller of gray iron castings whose net sales in the calendar year after 1942 are $40,000 or less to petition his OPA regional office for an order excluding him from the regulation.

Captive foundries which are not covered by regulation may now sell castings commercially on a limited scale without subjecting their operations to the OPA order. OPA says it is trying to encourage captive foundries to take on local accommodations business in the nature of repair and maintenance to make it possible for firms doing war work to shorten breakdown periods by quickly obtaining needed castings from nearby sources.

For castings which were not sold or offered for sale during the base period, a seller may now use as his maximum price the price at which he last contracted to sell the casting or one substantially the same before Aug. 1, 1941. If a seller elects to use this method he must adjust the last price in accordance with his applicable charges, discounts, quantity differentials and allowances in effect during the base period for sales to purchasers of the same class.

The specific prices which may be substituted for formula-determined prices generally will be lower because price levels were lower before the base period provided in the regulation. Through the use of specific prices, OPA said, foundrymen can afford the necessity of cost estimating and more complex record keeping. Sellers who use the alternate method must keep records which substantiate the prices so determined.

A provision requiring sellers to



file with their regional offices a report (Form 344:2) giving information as to wage rates, overhead rates, cost of materials, profit margins and pricing methods is amended to provide that an excluded seller who, by reason of increased sales becomes subject to the regulation, shall file the report within 30 days after his status changes. The time for filing Form 344:2 is extended from Dec. 26 to Jan. 15, 1943.

•

Gray Iron-Castings Prices

Washington

• • • **Sellers of** gray iron castings whose net sales during 1942 totalled $40,000 or less were excluded from price control on Dec. 21 by OPA. The effect is to free about 400 of the estimated 2000 commercial foundries in the country from the application of Price Regulation No. 244. The remaining 1600 foundries, however, do better than 98 per cent of the total volume of business.

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Action on Cotton Ties

Washington

• • • **Effective** Jan. 1, delivery of used cotton bale ties from plants in cotton states except for re-use was prohibited and new price ceilings were placed on reconditioned bale ties on Dec. 23 in joint action taken by WPB and OPA to encourage the reconditioning and re-use of old ties and to conserve an estimated 10,000 tons of steel which, an announcement said, would otherwise go into the production of new cotton bale ties. WPB's action was taken by issuance of Supplementary Order M-24-d. OPA's action was taken by issuance of Amendment No. 9 to Revised Schedule No. 49—Resale of Iron and Steel Products. The OPA amendment does not apply to sale of cotton bale ties by cotton ginners as part of their services, nor the combination sales of ties and bagging by cotton oil mills at a single price.

The WPB order will channel used ties directly back to the cotton industry for re-use rather than to the scrap pile. This will be done by permitting the sale of ties salvaged by cotton spinners, ginners and compressors only to persons baling cotton or textile products or to reconditioners of ties.

Maximum dollars and cents prices for used ties are as follows:

Mill run (as removed from bales and sold f.o.b. location of material):
Longs (11 ft. 6 in.), $1.25 cwt.
Shorts (less than above), 60c. cwt.
Reconditioned (sold in bundles of 30, f.o.b. appropriate port as either "whole ties" or as "riveted or spliced ties"):
1. On sales to ginners:
Whole second-hand ties (7 ft. 3 in. or longer), $1.45 per bundle
Riveted or spliced (7 ft. 3 in. or longer), $1.35 per bundle
2. On other sales:
Whole, $1.40 per bundle
Riveted or spliced, $1.35 per bundle
To the above prices for whole or riveted ties may be added freight from the ports which will result in the lowest delivered cost at destination.

Universal Gage Car To Serve Battle Fronts

Chicago

• • • **The Buda Co.** has developed a universal gage railroad track car, designed specifically to meet military needs on all battlefronts, R. K. Mangan, executive vice-president of the company, revealed last week in a year end report. This car can be adjusted to run on any gage track, such as the 30-in. gage tracks of Australia or the 66-in. gage tracks of Russia. The wheels and the brake mechanisms are assembled on side rails which can be moved in or out, to meet specific gage requirements, he said.

Mr. Mangan's report stressed that the company's wartime production had brought not only capacity operations to its expanded Harvey, Ill., plants, but also developments which assure the basis for postwar activity of record levels. Use of Buda products abroad, he said, will serve to expand existing foreign markets.

AFL Wins Alternate On President's FEPC

Washington

• • • **Boris Shishkin,** economist for the AFL general headquarters, has been appointed by the President as an alternate member of his Fair Employment Practice Committee, according to an announcement of the committee. Mr. Shishkin will serve on the committee when AFL President William Green cannot be present. He replaces Frank Fenton, head of AFL's organizing division, who has been the alternate member since the formation of the group.

Shishkin is at present serving as co-chairman of the Labor Party Committee, OPA; consultant to the Labor Production division of WPB and in several other advisory positions. John Brophy is the alternate for Philip Murray, president of the CIO.

Logan Appointed To WPB Compliance Div.

Washington

• • • **William John Logan,** formerly vice-president of the Central Hanover Bank & Trust Co., New York, has been appointed as Director of WPB's Compliance Division. At the same time, it was announced that Walter H. Foster of WPB's Legal Division will serve as Chief Compliance Commissioner, with headquarters in Washington. Previously Mr. Foster was a head attorney on WPB's legal staff.

Mr. Logan succeeds John H. Ward. Mr. Ward, now acting director of the Organizational and Procedural Office in the Office of the Program Vice-Chairman, replaces Livingston Short, who left WPB to engage in confidential work for the Government.

WPB Gives AA-1 Rating to Farm Machinery

• • • **With the statement** that 218,900 tons of finished steel had been allotted to the delivery of farm machinery, WPB said that a rating of AA-1 had been assigned to the delivery of critical material for farm equipment manufacture. The rating may be applied to the procurement of repair parts and was given to speed work on tillage and other equipment needed for spring planting.

CMP Procedure Regulation Is Expected Soon from WPB

Washington

• • • **WPB soon will** issue CMP Regulation No. 1 which covers the general procedure for applying for, receiving and making allotments and obtaining controlled materials from producers. It is planned, one highly placed WPB officials said, to issue additional regulations covering the relationship between the preference rating system and CMP, including distribution of fabricated products and non-controlled materials, warehouses and retail distribution of small quantities of controlled materials, maintenance, repair and operating supplies, inventories and construction and facilities reports by controlled materials producers and others.

The regulation which formalizes by order the CMP issued Nov. 2 has few material changes in substance. However, the regulation names six new claimant agencies which are as follows: Department of Agriculture; Office of Defense Transportation; Office of the Rubber Director; Facilities and Construction Bureau; Petroleum Administrator for War, and National Housing Agency.

Not yet set on paper is the plan to make CMP allotment and application forms into one. The objection of some officials is that the combination too closely resembles PD-25A. The order on inventories, to be issued shortly, will restrict stock to a 60-day minimum.

•

New Rule on Tool Orders

Washington

• • • **At the request** of the machine tool industry, George H. Johnson, WPB Director of the Tools Division, announced that after Dec. 25 orders for machine tools must be accompanied by a photostatic copy of the preference rating certificate under which the buyer obtained his rating, or by a certified copy. The new procedure provided by an amendment to Order E-1-b has the purpose of eliminating correspondence between the machine tool builders and their customers by supplying the machine tool producers at once with the information contained in the rating certificates.

The amendment also redefines the "miscellaneous" group of service purchasers of machine tools. The unrevised definition enumerated the units of the Armed Services covered by the term "miscellaneous branches and bureaus." This had the effect of excluding those units which were not specifically named. The revised definition adds to the enumeration "any other corps, department, bureau or service of the Army or Navy not heretofore specifically designated as a separate group, and their respective prime contractors and subcontractors."

•

Copper Clad Steel Scrap

• • • **Copper clad steel scrap** was brought under full allocation control Dec. 23 by Copper Order M-9-b as amended. The revised order also sets up a special procedure for the disposal of fired shell cases made of copper, copper-base alloy, or copper clad steel in amounts of 10 lb. or more. Persons seeking authorization to accept delivery of copper clad shell cases must furnish the Director General for Operations with a letter setting forth all details, including the end use to which the material will be put. Persons seeking delivery of copper or copper base alloy shell cases must apply to the Copper Division on Form PD-59.

Processors and manufacturers who generate any type of copper scrap are limited by the revised order to an inventory of one ton. Previously, an inventory of five tons was permitted. Similarly, reports are now required of any person accumulating 500 lb. of generated or obsolescent scrap in any one month, instead of 2000 lb.

•

Trolley Lines Aided

• • • **Street railway** systems and trolley bus lines are brought within the scope of preference rating regulations now governing steam railroads in the purchase of operating supplies, repair parts and maintenance materials, through an amendment to Preference Rating Order P-88, announced Dec. 23, which broadens the definition of the term "railroad" to include urban electric transit systems. The amendment lays the basis for allocations of iron and steel or other critical materials under CMP to provide for the production of repair parts and operating supplies for the street railway and trolley bus industries. A rating of A-1-j is authorized for delivery of certain materials. Use of this rating will be controlled by quarterly inventory reports to be submitted on Form PD-351. The form is prescribed for use also in obtaining various types of raw materials such as steel bars and other semi-finished metal products.

•

Fluorspar Conservation

• • • **A voluntary** conservation program to reduce consumption of fluorspar by steel producers some 10 to 15 per cent was announced Dec. 23 by the fluorspar section and the steel division of WPB.

This action was taken in an effort to avoid an expected shortage of 50,000 tons of metallurgical grade fluorspar in 1943. Shipments of all grades from mines to consumers in 1941 were 320,000 tons, an increase of 80,000 tons over 1940. In 1943, requirements for all grades are expected to be close to 500,000 tons. Domestic production has been increased to 350,000 tons this year.

WPB has called to the attention of steel makers the seriousness of the situation and has asked for voluntary conservation to reduce the amount of fluorspar used per heat.

•

Zinc Dust Under Control

• • • **Zinc dust** will be put under complete allocation and use control Jan. 1, by Order M-11-l, issued Dec. 22. At the same time Order M-11-a, covering zinc oxide and zinc dust, was amended to eliminate any reference to zinc dust after Jan. 1. Under the new order, the entire supply of zinc dust will be allocated. Allocation certificates will be issued by WPB to consumers about the first of each month for delivery during that month. Applications for allocations are to be made on Form

PD-755 before the 15th of the month preceding the month in which delivery is sought.

•

Farm Machinery Action

• • • **Top priority** of AA-1 was assigned Dec. 21 by WPB to delivery of critical material necessary to manufacture farm machinery included on the current program. The high rating will be applied to material for new machinery as well as for repair parts for existing equipment. The rating was given to speed work on tillage tools and other equipment needed for the coming spring planting season.

Involved in the priority assignment are 218,900 product tons of steel, in addition to companion materials, which will be marked for delivery during the first quarter of 1943.

In addition to the farm machinery permitted by Order L-170, the larger manufacturers who had large inventories of usable materials on hand, have been permitted to use up those existing inventories.

•

Grates Being Made

• • • **Production** of fireplace grates is permitted from Dec. 21 to Jan. 6, the WPB ruled Dec. 19. All such production had been suspended under Orders M-126 and L-30-D. Only scrap material may be used, and the grates produced can weigh no more than 30 lb. each, it is specified in Amendments No. 4 to general conservation order M-126 and No. 1 to Order L-30-D.

•

Military Exemption List Under M-126 Is Revised

• • • **Revision of** the military exemption list (List C) of the iron and steel conservation order, M-126, was announced Dec. 24 by WPB. The revised list C sets forth equipment and products permitted to be made of steel and stainless steel for the Army, Navy, Maritime Commission and War Shipping Administration.

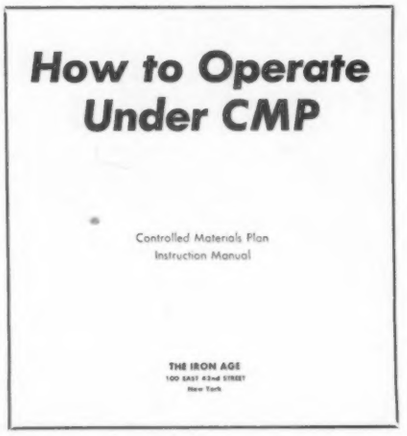
The amendment is No. 1 to the order as amended Dec. 17. It lifts the ban on steel for certain essential civilian items, including wheelbarrows for handling hot ashes. The only item added to the prohibited list is quicksilver flasks. Other products released from the general ban on the use of steel are:

Closures for glass containers for coffee (from distressed stocks of blackplate only, lithographed on or before Sept. 3, 1942, and until Feb. 1 only); laboratories for railway cars; photo copying equipment for war plants; railings and barriers for industrial use; wire for ratproofing refrigerator boxes; window shades and rollers for railway cars; certain essential types of ceramic making machinery; adhesive tape spools (until March 30); lamp manufacturing machinery; spools for wire used in industrial processing; name, data and instruction plates for machinery and equipment; box and dobby looms for textile machinery; industrial electric vibrators; floor polishing machines, window sash weights; and closures for anti-freeze containers.

Products or equipment released from the ban on the use of stainless steel are: Miners' lamps; data and instruction plates; needle valves for stoves, ranges or hot plates; pipe tubes, tubing and fittings; and repair and maintenance materials for baskets.

Among the products appearing on the military exemption list for the first time are:

Access panels of stainless steel for radio equipment; certain types of air conditioning equipment; aircraft fire walls (stainless permitted where required for non-magnetic properties); bases on refrigerating machines for use on board ship; buckets and pails; buckles for clothing; stainless steel cabinets for radio equipment; manhole covers; meter frame covers; fence posts; stainless steel fans for use on board ship and where required for corrosion resistance; first aid kits; flag holders; hose clamps of stainless steel for aircraft; dental cabinets; stainless steel instrument dials and cases; step ladders; stainless steel mechanical drawing and drafting equipment; motion picture cameras and projectors—stainless permitted for sprockets and aperture plates; music stands for use on board ship; motion picture screen stands; paint spray outfits—stainless permitted for nozzle tips and needle valves; partition studs for radio equipment; photographic equipment; plumbing and heating equipment; reels, cable, and rope for combat and field training purposes and on board ship; spools for ink ribbon and wire; stencils; tent frames and supports; shutter type ventilators for use on board ship and for use without exhaust fans.



NEW HANDY GUIDE: A revised edition of THE IRON AGE CMP Handbook came off the press last week. This is the cover of the booklet, which explains CMP in detail, with charts, tables and questions and answers. Copies are available at 25c. each. Please send stamps with orders for four or less. Address THE IRON AGE, Reader Service Department, 100 E. 42nd Street, New York.

•

Higher Rating Provided

• • • **To permit** greater use of reconditioned equipment in the wire communications industry, both as a means to save critical materials and to provide additional supplies of serviceable equipment, several minor revisions of amended limitation Order L-148 were announced Dec. 19.

An A-1-A preference rating is provided instead of A-7 in obtaining new and used equipment for plant and lines.

•

WPB Announces CMP, Class B List

Washington

• • • **Completion of the Class B** lists of CMP was announced on Monday by Harold Boeschenstein, director of the WPB, CMP Division. Printed copies will be available within two weeks, WPB said. The list, which names some 500 Groups of related items or separately 6000 items classified as B products are regarded as tentative at present and may be altered slightly as experience dictates.

•

L-183-a Effective Feb. 15

Washington

• • • **Scheduling** or deliveries of electronic equipment under the precedence list issued by the Joint Communications Board of the Army and Navy will begin Feb. 15, 1943, instead of Jan. 1, 1943, WPB said last Friday. The change was made in an amendment to Order No. L-183-a.

•

Wiebel Resigns WPB Post

Washington

• • • **Arthur V. Wiebel,** assistant to United States Steel Corp. vice president in charge of engineering, resigned Dec. 11 from his post as executive consultant in the WPB Iron and Steel Division. Mr. Wiebel is leaving WPB because of pressure of work in his company. A graduate of Carnegie Tech in 1928, and a professor there during 1932-33, Mr. Wiebel has held active engineering positions with the Koppers Co., and Carnegie-Illinois Steel Corp. and has been associated with United States Steel Corp. or its subsidiaries since 1933.

This Week's Priorities and Prices

Scrap material only may be used in the manufacture of fireplace grates and grates produced can weigh no more than 30 lb. each, it is specified in Order M-126 and L-30-d as amended. (T-1428)

Gray iron castings sellers whose net sales during 1942 total $40,000 or less are excluded from price control, and sellers are provided with an alternate method for establishing maximum prices for castings not sold during the base period in Amendment No. 2 to Regulation 244, effective Dec. 26. (OPA-T-418)

Machine tool orders placed after Dec. 25 must be accompanied by a photostatic copy of the preference rating certificate under which the buyer obtained his rating, or by a certified copy, under Order E-1-b, amended Dec. 19. (T-1443)

Zinc dust will be put under complete allocation control Jan. 1 under Order M-11-1 issued Dec. 22. (T-1447)

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For copies of above announcements address Office of War Information, Washington, giving announcement number as shown in parentheses after each paragraph.

Revisions to The Iron Age Priorities Guide

• • • The following data, together with all intermediate weekly revisions in THE IRON AGE, should be added to THE IRON AGE Priorities Guide published with the issue of October 8 to bring the Guide up to date.

"M" Orders:

M-11-a...Amended to eliminate any reference to zinc dust after Jan. 1, in view of new order M-11-1.

M-11-1...Places zinc dust under complete allocation and use control, Jan. 1 (12-22-42).

M-126...Order provides that only scrap material may be used in manufacture of fireplace grates (12-19-42).

M-154-b...Revoked (12-22-42).

M-162...Interpretation No. 1 (12-19-42) states that order does not include repair and sizing of jewelry where additional platinum is not used.

"P" Orders:

P-84...Amended order provides that priorities ratings provided under the order cannot be applied to obtain plumbing and heating equipment where such equipment is subject to OPA ration certificates (12-18-42).

"E" Orders:

E-1-b...Amendment No. 4 (12-19-42) changes machine tools preference rating procedure.

"L" Orders:

L-30-d...Amended order provides that only scrap material may be used in manufacture of fireplace grates (12-19-42).

L-41-b...Supplement extends action facilitating fuel conversion (12-21-42).

L-79...Amended order provides that no person may sell or deliver to a consumer any plumbing or heating equipment the transfer of which is subject to a ration order (12-18-42).

L-148...Amendment (12-18-42) improves preference rating for use by the communications industry.

L-157...Amendment (12-22-42) exempts handsaws for export from restrictions.

L-183-a...Amendment No. 1 (12-18-42) changes effective date of order from Jan. 1 to Feb. 15.

L-185...Order limits manufacture of gas fired and oil fired water heaters (12-21-42).

L-199...Order prohibits manufacture and installation of metal tank supports (12-21-42).

Conserving Steel Studied for Oil Industry Pumping Units

Washington

• • • **The possibility** of conserving steel in pumping units is an immediate study under consideration by the committee on production of the Petroleum Industry War Council which with the petroleum administration for war has approved a plan to conduct a series of studies looking to more efficient operating practices and adequate substitutes for critical materials. Deputy Petroleum Administrator Ralph K. Davies said that all subjects for study will be determined by the committee on production, which will report its findings and recommendations to PAW.

Refrigerators Go Wooden

Ottawa

• • • **Manufacture in Canada** of wooden ice boxes and apartment house refrigerator cabinets has been placed on a permit basis and after the end of the year the design of such articles must conform to specifications of the Supplies Controller, it was announced by the Department of Munitions and Supply. A new order prohibits manufacture of more than two models of domestic refrigerators by any manufacturer. The total weight of metal, including joining and fastening hardware in any domestic refrigerator shall not exceed 14 pounds if ice capacity is less than 100 pounds or 17 pounds if ice capacity is more than 100 pounds. No metal may be used for exterior surface, food compartments, or food compartment shelving.

Jones & Laughlin Sets Record Christmas Day

Pittsburgh

• • • **Breaking by more** than 40 tons their previous record set Dec. 5, the Otis works of the Jones & Laughlin Steel Corp. demonstrated to the industry that war steel production led Christmas holiday spirit in importance, by setting a new basic ingot production record on Christmas Day.

E. J. Kulas, chairman of the Otis works, Cleveland, said of the men's spirit, "They realize that there are no holidays on the battlefronts and that all our steel making facilities must be kept working every day to produce war steel."

November Munitions Gain Biggest on Record

Washington

• • • **In a sixth of a series** of monthly reports on war production, WPB chairman Donald M. Nelson on Monday said that November represented the biggest monthly gain in munitions production since the country began to arm in 1940.

The box score by major objects of production increase in November over October: Airplanes, 18 per cent; ordnance, 13 per cent; Army and Navy vessels, 9 per cent; merchant vessels, 26 per cent, and other munitions, 9 per cent.

Alloy Standards Revised, Ferro-Alloys Expedited

Washington

• • • **In order to** facilitate ordering and storing, and to expedite deliveries of certain ferro-alloys and metals, new and simplified ranges of standard sizes are now being produced by Electro Metallurgical Co., a unit of Union Carbide and Carbon Corp., 30 East 42nd Street, New York.

PERSONALS

• **Harry G. Smith** has been named operations manager of the Aircraft Parts Division of Reynolds Metals Co., Louisville. He will superintend the opening and operation of five additional plant buildings which have just been leased by Reynolds. Mr. Smith, formerly of the Hoosier Lamp and Stamping Co. at Evansville, Ind., will make his headquarters in Louisville. Mr. Smith, who earned his B. S. degree in Engineering at Michigan State College in 1923, was associated for seven years with the Hoosier Co., where he served successively as plant manager, assistant to vice-president, and contracts manager. Prior to this, he spent twelve years as production superintendent of various hardware plants.

HARRY G. SMITH, operations manager of the Aircraft Parts Division of Reynolds Metals Co., Louisville.

CARL G. PREIS, vice-president in charge of engineering of the American Can Co.

• **Ernest S. Freeman,** president and general manager of the B. F. Sturtevant Co.; **Harry H. Kerr,** president of the Boston Gear Works, Inc.; and **William Rand** vice-president of the Monsanto Chemical Co. have been made members of the Northeastern University Corp., Boston.

• **Irving A. Oehler** has been appointed chief metallurgist of the American Welding & Mfg. Co., Warren, Ohio. Mr. Oehler has been with Republic Steel Corp. in its Buffalo district since completing his education at Rensselaer Polytechnic Institute seven years ago. He started with Republic in 1935 as a helper in the metallurgical laboratory. Early in 1936 he became a general analyst in the chemical laboratory and later the same year a metallurgical observer. Early in 1937 he was made a metallographist and later in the same year chief inspector. In January of 1938 he was named open hearth metallurgist, and in June of 1940 assistant chief metallurgist of the Buffalo District.

• **Arthur A. Aranson,** assistant to the president, Crucible Steel Co. of America, has resigned from that position. He was formerly an officer of the International Harvester Co. in Chicago.

• **Roger W. Allen,** district sales engineer for Foxboro Co. at Atlanta, Ga., for the past six years, has been named southeastern district manager for Wheelco Instruments Co., Chicago. He will make his headquarters at 305 Techwood Dr., Atlanta.

• **John H. Sipchen** has been named first assistant to the president of Anker-Holth Mfg. Co., Chicago. Mr. Sipchen was formerly vice-president in charge of sales, engineering and production for Manufacturers' Equipment Co., Chicago. Previously he had similar duties as vice-president and general manager for the Hannifin Mfg. Co., Chicago. He also served for a number of years as sales engineer for Ellis Engineering Co., Chicago.

JOHN H. SIPCHEN, first assistant to the president of the Anker-Holth Mfg. Co., Chicago.

• **Carl G. Preis** has been elected vice-president of the American Can Co. in charge of engineering. Mr. Preis, who was formerly chief engineer of the company, is also vice-president and general manager of the Amertorp Corp., a wholly-owned subsidiary corporation engaged in the manufacture of naval and aerial torpedoes.

• **P. W. Foster, Jr.,** has been elected to the office of vice-president of the Foster Wheeler Corp. Mr. Foster is a graduate of Princeton University. In 1919 he joined the sales department of Power Specialty Co. and progressed consistently, having charge of the Boston office for sometime. Later he moved to New York where he directed the industrial department, and more recently the steam generation division.

• **John P. Courtright** has been named vice-president in charge of sales of the Marion Steam Shovel Co., Marion, Ohio, to take effect immediately. Until now, and since a year ago, Mr. Courtright has been director of sales of the company.

• **D. U. Bathrick,** lately an executive in the Washington office of General Motors Corp., has been put in charge of that office succeeding **R. H. Grant,** vice-president of General Motors, who returns to Detroit to resume his former duties there.

• **Harold Niemeyer,** plant superintendent at Seattle, was made general superintendent of both the Seattle and Lynwood plants of Western Gear Works. He will headquarter at Lynwood, dividing time with Seattle. Tony Danninger will go to Lynwood as general foreman.

• **Glenn W. Shetler,** formerly production manager of Crucible Steel Co. at its Syracuse plant, has become associated with Barium Stainless Steel Corp. of Canton, Ohio, as general manager.

Mr. Shetler has been in the steel business since 1916, when he joined the United Steel Co. in Canton. In 1924 he was made assistant production manager of United Alloy Steel Corp. In 1928 he went with Crucible Steel in charge of orders and production for the Halcomb Division. He worked in this capacity for ten years at which time he was made general superintendent of the Halcomb Works. On March 1, 1941, Mr. Shetler organized the order and production department for the Sanderson Works, Emerson Works and Halcomb Division, all in Syracuse.

• **Charles C. Fichtner** has been appointed vice-president and treasurer of the Strippit Corp., North Tonawanda, N. Y. He formerly was chief of field service and chief of division of regional economy in the Department of Commerce at Washington.

• **Keith Williams,** vice-president and general manager of Pratt & Letchworth Co., Inc., Buffalo, malleable iron and steel castings producer, has been elected president. He joined the company in May, 1926, as works manager.

• **Ingle R. Shue** of the Gardner Machine Co., Beloit, Wis., has been appointed a member of the American Standards Association's sectional committee on the safety code for the use, care and protection of abrasive wheels.

• **W. Mikelson** of the General Electric Co., Schenectady, and **A. M. Swigert,** master mechanic of the Chrysler Corp., Detroit, have been appointed members of the sectional committee on classification and designation of surface qualities of the American Standards Association. The scope of the committee is to classify and designate surfaces according to quality of surface.

OBITUARY . . .

• **Charles A. Kropp,** chairman of the board of the Kropp Forge Co. and the Kropp Forge Aviation Co., Chicago, died Dec. 17. He was 77 years old. C. A. Kropp was widely known in the steel industry and metal working trades, having been identified with the forging industry all his life. He organized one of Chicago's earliest job forging shops in 1901 known as the Sundberg-Kropp Co., the present extensive Kropp Forge Company and subsidiaries having evolved from this nucleus organization.

CHARLES A. KROPP, who was chairman of the board of the Kropp Forge Co. and the Kropp Forge Aviation Co.

• **Walter P. Murphy,** president of Standard Railroad Equipment Manufacturers Co., Chicago, died last week in Los Angeles. He was 69 years old. Mr. Murphy started in the railroad business some 50 years ago and at the time of his death headed one of the largest railroad companies in the world. In 1939 he gave Northwestern University $6,735,000 for a technological institute. The building was completed and dedicated early this year.

• **Raymond J. McCabe,** vice-president in charge of sales of electrical materials for Indiana Steel & Wire Co., Muncie, Ind., died at his home on December 6 after an extended illness. He was 55 years old. Mr. McCabe spent 30 years with Western Electric Co. and Graybar Electric Co., Inc., before joining Indiana Steel & Wire Co.

• **Herman Cohen,** president of the Standard Steel & Rail Co., St. Louis, died of pneumonia recently. He was born in Lithuania 79 years ago.

• **Oscar E. Niedringhaus,** president of Niedringhaus Metal Products Co., St. Louis, died following a heart attack. He was 72 years old. He had been actively engaged in the business he founded in 1908.

• **Frederick Chambers Blanchard,** vice-president and chief engineer of the Rivett Lathe & Grinding Co., Boston, died recently. Formerly he was associated with the Ashcroft Mfg. Co., Bridgeport, Conn. A native of Dorchester, Mass., he was graduated from M.I.T. in 1891.

• **John E. Lambert,** founder of the Clayton & Lambert Mfg. Co., Detroit, died recently. Mr. Lambert retired 15 years ago as president of the company which he established in 1888.

• **David S. Youngholm,** vice-president of the Westinghouse Electric & Mfg. Co. in charge of the company's lamp division, Bloomfield, N. J., died recently from a sudden heart attack. He was 53 years old.

• **John C. Scheeler,** president of the Buffalo Wire Works Co., Buffalo, N. Y., died Dec. 14 in a Buffalo hospital from a heart attack.

• **Emory L. Ford,** president of the Michigan Alkali Co., died Dec. 20 in a Detroit hospital. He was also president of the J. B. Ford Co. and a vice-president and director of the Huron Portland Cement Co.

• **John Mayes,** vice-president and general manager of the Mayes Bros. Tool Mfg. Co., died at his home at Port Austin, Mich., Dec. 20.

• **Clifford A. Nickle,** consulting engineer at the General Electric Co. and one of the few men in the world to produce artificial diamonds, died Dec. 8 at Schenectady. Mr. Nickle entered General Electric's test course at the Erie, Pa., Works in 1920 after serving as an instructor in the U. S. Army Signal Corps until the end of the war. In 1920, he was transferred to the Generator and Motor Engineering Department at Erie. In 1923 he was transferred to Schenectady, where he became assistant to the late Dr. Charles P. Steinmetz.

MACHINE TOOLS

. . . Sales, Inquiries and Market News

Some Confusion Seen In Bonus Rulings

Cincinnati

• • • **The district machine tool** market is without interesting feature. By and large the most of the plants observed the Christmas holiday, but full production was maintained during the remainder of the week. In some instances, however, additional days off are being provided for night crews so that full opportunity to employees is accorded to enjoy the Christmas Season.

Financial and personnel departments are busy attempting to reconcile bonus programs with the recent wage stabilization program, and although Washington has indicated that so long as the same percentage of bonus is maintained, payment is permitted, but confusion exists because of a recent Treasury ruling that the dollar and cent total may not exceed that of last year's. Of course, the question of retaining personnel is constantly becoming a tougher problem in the industry, as draft boards seek to make their quota for each call.

Improved Cutting Compounds Described in Oakite Bulletin

• • • **How new, improved grinding coolants** and cutting lubricants are increasing tool life, reducing need for tool changes, speeding up production and providing better finishes, closer tolerances and fewer rejects in armament and munitions manufacture is the subject of an illustrated 5-page article appearing in the November-December, 1942 issue of *Oakite News Service*, bimonthly house magazine of Oakite Products, Inc., 304 Thames Street, New York.

Concisely reviewing the essential requirements governing the selection and application of grinding compounds and cutting fluids for various machining operations, the article also gives four representative "case histories" on steel fuse bodies, 5-in. naval guns, machine gun parts and 155-mm. shells, showing the direct influence of these important factors on quantity and quality of output in each of the particular instances cited.

"Bombs—Precision Instruments of Destruction" is the title of another article in the same issue. It outlines the production cycle from raw material to finished product, placing particular emphasis on the degreasing or related operations required in the manufacturing process.

I Dip My Wing To You!
Lt. BEN JOY
formerly 36 B-7
first pilot of a 4-motored
Consolidated Liberator
"Congratulations on winning the Army-Navy E flag! May she continue to fly at ND until we are victorious.
"Keep 'em rolling — we'll keep 'em flying!"
Men and Women of
NEW DEPARTURE
must continue to rate this flag
NAVY

PERSONALIZED WAR POSTERS: **While hundreds of plants are using war posters to show workmen the need for maximum production of planes, ships and guns, the New Departure Division of General Motors Corp., Bristol, Conn., has developed something new. Giant photographs of former fellow employees now in the armed forces look down at New Departure workmen to remind them that to save the U. S., the workmen must "keep 'em rolling."**

Paul is in the army now
Pvt. PAUL O'NEAL
of Building 86
in U.S. Infantry
He says:
"This is a fast-moving war. We need equipment faster than it is produced.
When production slows down, we slow down.
Keep 'em rolling, boys."
LET'S GO, NEW DEPARTURE!

Flame Hardening Discussed by AWS

Detroit

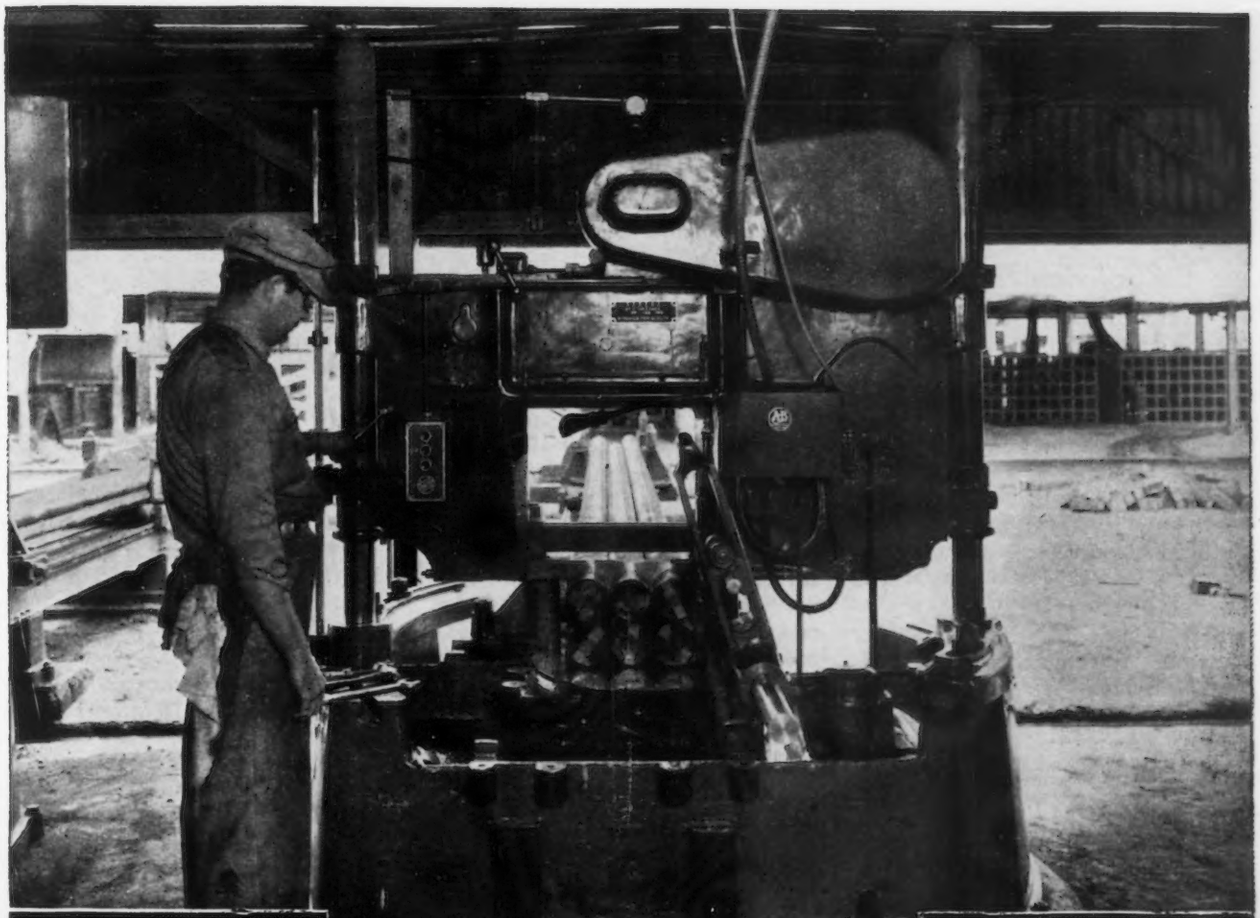
• • • **Flame hardening** and brazing occupied the attention of the Detroit Section of the American Welding Society at its December meeting.

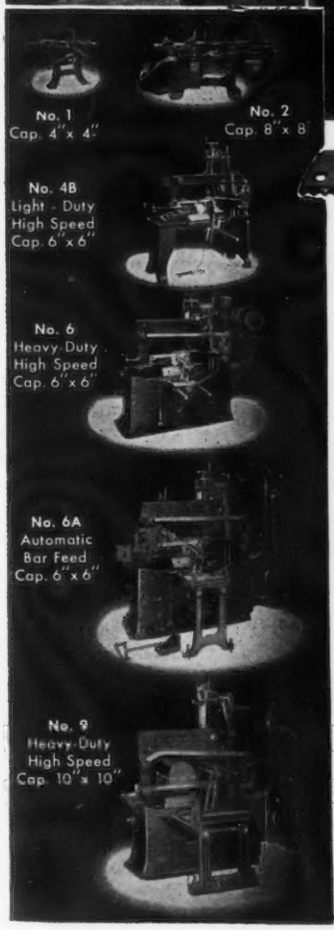
A. H. Yoch, welding engineer of the General Applied Engineering Department of Air Reduction Sales Corp., spoke on "Flame Hardening and Cutting in Ordnance Work." Dr. Armand DiGiulio, research metallurgist, Bundy Tubing Co., Detroit spoke on "Methods of Brazing."

Canada Broadens on Tin Plate

Ottawa

• • • **The recent order** prohibiting the manufacture in Canada of metal signs and disks has been amended to permit the use of terneplate salvaged from old tin cans in the making of war factory personnel tags, badges or disks, Department of Munitions and Supply announced. The new order issued by Deputy Supplies Controller J. H. Lamprey also permits the making of such tags, badges and disks from uncoated steel in the form of tin mill black plate or black sheets other than prime material; or from tinplate or terneplate known as "waste," "cobbles" or scrap. From metals of the same types, tags, badges, disks may also be made for the identification of poultry or livestock or for the marking and identification of metal in its production and shipment.





MARVEL SAWS

Cut anything that will go between the jaws

This is one of five No. 18 MARVEL Giant Hydraulic Hack Saws used by a well known Texas tool company to cut-off "multiple bars of alloy steel in round, square, and flat shapes, up to the maximum capacity of the large work-throat (18" x 18")".

These super hack saws are designed for the largest sizes, and toughest steels—up to 18" x 18". After a year's heavy duty service, when asked as to the effectiveness of these saws in solving the cutting-off problems at this plant, the mechanical engineer in charge reported them "very effective."

ARMSTRONG-BLUM MFG. CO.

"The Hack Saw People"

5700 Bloomingdale Ave.
Chicago, U. S. A.

Eastern Sales Office:
225 Lafayette St., New York

NON-FERROUS METALS

. . . Market Activities and Price Trends

Strike Paralyzes Half Of Bolivian Tin Output

• • • **In a dispatch** from La Paz, Bolivia, dated Dec. 24, *Allied Labor News* reports that more than 10,000 tin miners are out on strike, interrupting half the total Bolivian tin production. At present the strike is confined to Patino mines, but union officials have been jailed, martial law is prevailing in mining camps, and, according to the dispatch, "a general strike this week was considered certain."

Patino Mines & Enterprises is controlled by Simon Patino, the British Williams-Harvey interests, and the National Lead Co.

Until recently the tin crisis centered in the Hochschild mines of Potosi, where demands for an improvement in daily wage rates averaging 6.60 bolivianos—(15c.)—had been persistently refused. The Patino management, after negotiating with miners' representatives agreed to raise wages an average of 30 per cent and abolish the company store system, but it is reported that Mauricio Hochschild intervened in the negotiations, and organized a united front of the Patino, Arramayo and Hochschild interests which jointly informed General Peneranda, president of Bollivia, that they will grant no wage increases unless he vetoes the Busch Labor Code, recently adopted by the Bolivian parliament and approved by the cabinet. The code had been suggested by the U. S. government, which in July, through Metals Reserves Co., also raised the Bolivian tin prices from 48½c. to 60c., retroactive to last Jan. 1.

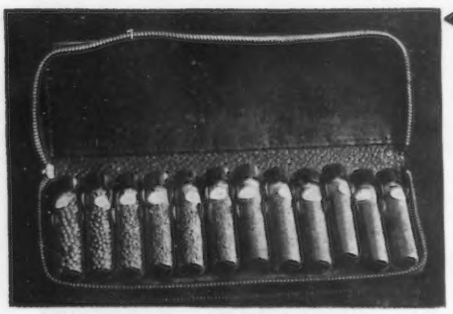
Labor relations and conditions in the Bolivian tin mines, on which the new Texas smelter is almost wholly dependent for its concentrates and which are also now the major British tin source, appear to be in a mess. Production the first ten months of this year was under last year's output, and was running at about 85 per cent of the quota set by the International Tin Control agreement. Heaviest declines were in the Patino and Hochschild mines, with Arramayo and the small producers showing an increase. (See THE IRON AGE, Dec. 10, p. 140). In November, exports dropped to 2,221 tons, compared with 3,736 tons in November of 1941.

Political accusations and counter-accusations flew last week. The government called the strike a "leftist revolutional plot," called by "pro-Soviet extremists" and "pro-Nazi labor leaders on orders from Berlin." On the other hand, the Potosi miners' paper, *Izquierda*, reported that Hochschild employs Walter Meyer and Frederich Wille, members of the German Club in his La Paz office, a Nazi leader named Rudershausen and another named Duchweiler, and a Chilean strike-breaker named Gayan, who is accused of selling plans of the Potosi mines to Nazi agents.

Hochschild's Potosi miners last week voted to postpone a strike after their union leaders characterized the strike as desired by the company to break the union and by the Axis to cut off the United Nations' supply of tin. Previous postponements had been voted to Nov. 28, Dec. 8 and Dec. 12, but much further postponement is considered doubtful.

Anaconda Indicted on Charge of War Frauds

• • • **Anaconda Wire &** Cable Co. and five of its employees have been indicted by the U. S. Department of Justice on charges of fraud and conspiracy in supplying the armed services with defective wire and cable. The Department has charged that the company's Marion, Ohio, plant contained "a button box" by means of which tests were faked, and that in some cases labels from tested and approved material were



HEAT-TREATED STEEL SHOT

We manufacture shot and grit for endurance

A shot or grit that will blast fast with a clean finish.

This is the only reason why so many operators are daily changing to our shot and grit, from Maine to California.

The unprecedented demand for our—

Heat-Treated Steel Shot and Heat-Treated Steel Grit

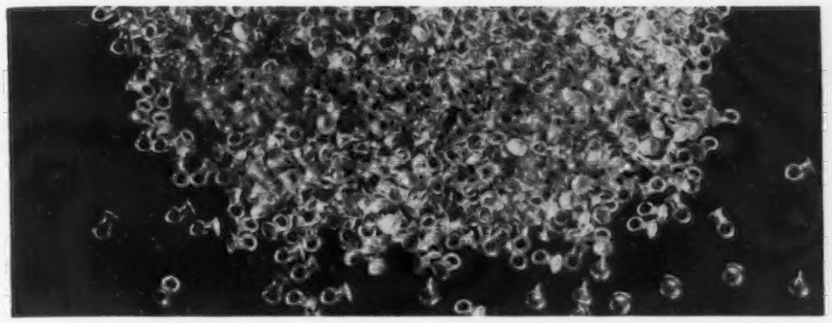
has enabled us to expand our production and maintain a quality that is more than satisfactory to our hundreds of customers all over the country.

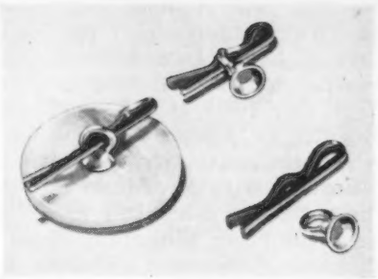
•

HARRISON ABRASIVE CORPORATION

Manchester, New Hampshire

HEAT-TREATED STEEL GRIT





.0393 OZ. DIE CASTING: These tiny button shanks, numbering 4100 to the lb., are die cast by New Jersey Zinc Co. in an entirely automatic machine at a rate of 300 a min. They are barrel plated with silver and assembled to the buttons by placing the shank in the undercut recess of the button and using a deforming tool. The photograph on the left shows the assembled button.

transferred to untested wire and cable. Investigations are also being carried on by the Department into the operations of the company's Pawtucket, R. I., branch to determine if a similar charge is to be made out against it.

H. Donn Keresey, president of the company, issued a statement saying that all employees responsible for alleged circumvention of government inspection have been discharged, and that none of the responsible officers or executives of the company had any knowledge of the situation. The product concerned represented about 5 per cent of output of all the company's mills, he said. The Marion plant received an Army-Navy "E" in August.

•

Lead Allocations Grow

• • • **Lead allocations** in December were about twice those for November, it is believed. However, the rate of demand did not accelerate during the month, and January allocations will therefore probably run about the same as December's. The increase indicates that the program of substituting lead for more critical materials and for using more lead in war work is showing some success.

O'Leary Firm Changes Name

• • • **The Arthur J. O'Leary & Son Co.** of Chicago, is changing its name, effective Jan. 1, to the Kelly-O'Leary Steel Works.

Inland Says WLB Plan Will Delay Iron Ore

• • • **The Inland Steel Co.** contended this week that the recent WLB mediation panel's recommendation on their controversy with the National Maritime Union affecting workmen on their Great Lakes ore vessels will retard iron ore shipments if permitted to stand. The recommendation made by the panel called for preferential union employment, overtime pay, unrestricted passes for union agents and the abolition of bonuses for continuous service.

Inland stated flatly that the recommendation relating to hiring, overtime and bonuses would interfere with vessel operation at the most crucial period in the history of Lake transportation and introduce a doubt as to whether the present level of performance could be maintained. The recommendation was also called inconsistent with the national anti-inflation policy. The WLB decision in the case will not necessarily follow the plan of the recommending panel.

Miscellaneous Non-Ferrous Prices

ALUMINUM, delivered: virgin, 99 per cent plus, 15c.-16c. a lb.; No. 12 remelt No. 2, standard, 14.50c. a lb. NICKEL electrolytic, 35c.-36c. a lb. base refinery lots of 2 tons or more. ANTIMONY, prompt; Asiatic, nominal. New York: American, 14.50c. a lb., f.o.b. smelter. QUICKSILVER, $197 to $199 per 76 lb. flask, f.o.b. shipping point. BRASS INGOTS, commercial 85-5-5-5, 13.25c. a lb.

A MILLION
NEW CUSTOMERS
FOR SPRINGS!
The Treasury Bull's-eye Flag awarded B-G-R Springmakers for purchase of War Savings Bonds

Every man in our armed forces is a user of springs, whether he fires a gun, drives a truck, or works an office machine. Equipping our forces for combat is big business—the biggest of all! That's why even B-G-R—with its two modern, automatically functioning spring plants—must produce springs with machine gun rapidity to keep step with other vital products needed for warfare.

B-G-R
SPRINGS
Wire Forms
Small Stampings

BARNES-GIBSON-RAYMOND DIVISION OF ASSOCIATED SPRING CORPORATION
DETROIT & ANN ARBOR, MICHIGAN

SCRAP

. . . Market Activities and Quotation Trends

Weather Again Cuts Movement of Scrap

• • • **Another week** of difficult weather has slowed collections and preparation of iron and steel scrap, forcing consumers to dip deeper into their stockpiles.

Available reports at the start of the week did not indicate the presence of serious shortages at any major consuming point. Several more weeks of extremely bad weather undoubtedly would put some mills in a precarious position on scrap supplies, due to the high rate of consumption.

Meanwhile, reports from additional areas show that household scrap collections when repeated are far below expectations, compared with the record tonnages brought out last fall. Apparently, the hopes of scrap consumers for an increased flow must rest on normal and dormant industrial scrap collections.

• • • **Consumption of** iron and steel scrap eased off in November to 4,621,000 gross tons from 4,883,000 gross tons in October, due entirely to the shorter month and the Thanksgiving holiday, according to the Institute of Scrap Iron & Steel Inc.

For the first eleven months of 1942 consumption of scrap is estimated by the Institute at 51,148,000 gross tons, which compares with 48,989,000 tons in the corresponding period of 1941, and 37,737,000 tons in the same period of 1940.

Domestic stocks of iron and steel scrap at consumer, supplier and producer plants at the end of October approximated 6,260,000 gross tons, an increase of 13 per cent over the 5,545,000 tons on Sept. 30, according to the Bureau of Mines.

Among priority actions last week, copper clad steel scrap was brought under full allocation control by Order M-9-b as amended. Further details will be found in the priority section.

Moskowitz Named Head of Convention Reception Group

Washington

• • • **Herman D. Moskowitz,** of the Schiavone-Bonomo Corp., Jersey City, N. J., has been made chairman of the reception committee for the 15th Annual Convention and War Conference of the Institute of Scrap Iron & Steel Inc., Washington, to be held in New York, Jan. 16-17, it was announced Dec. 22 by Joseph A. Moskowitz who is the convention chairman.

Serving with Mr. Moskowitz on the reception committee are William Abramson, William H. Hundt, Richard V. Bonomo, Thomas R. Allen, Barney Magen, William Frost, Robert Joseph, Joel Claster, Walter S. Gates, Herman Fradis and George Stout.

Joseph Colvin, of the Scrap Materials Service Corp., New York, who is chairman of the publicity committee, is ex officio a member of this committee.

•

CLEVELAND—Scrap supplies in the Cleveland and Valley areas have held substantially the same for the past several weeks, with the Cleveland area holding about a six weeks' supply of scrap at the mills and the Youngstown-Warren district holding about four weeks' supply. Yards likewise have substantial stocks that are now being prepared for shipment to the mills as fast as the weather conditions and labor supplies will permit.

•

CHICAGO—The cold weather of the past two weeks, the longest and the earliest cold snap experienced here in many years, is acting to slow up the movement of scrap into dealers' yards. However, the flow of scrap into consumption is holding up well. This deficiency in dealers' receipts is expected to aid in eating into the public drive material which has backed up in many yards.

•

BOSTON—A week of sub-zero weather made working conditions at yards poor and railroad cars difficult to obtain. Shipments dropped sharply as a result. Since government agents started keeping records last July, New England monthly shipments of salvaged scrap have averaged 100,000 tons. November shipments were 115,000 tons, of which Massachusetts furnished 44,000 tons. The best recorded month was October with 130,-

International News Photo

ROLLS ROYCE MOSQUITO: This is one of the first pictures released of Britain's new all-wood "Mosquito Bomber." This unique bombing plane which is in full production in Canada is said to be the world's fastest. Its twin Rolls Royce engines are credited with giving it the maneuverability of a fighter craft. The plane's speed is a military secret. The body is made entirely of ply-wood layers with balsa between.

000 tons. December's showing probably will be under November.

o

BIRMINGHAM — Scrap receipts here remain generally satisfactory although inclement weather has hampered collections to some extent.

o

PHILADELPHIA — Shipments were slightly less than last week due to the short Holiday week and cold weather and rain had a retarding effect on yard preparation. This slowness of movement was noted for the second week in succession and seems to prelude a period of reduced scrap supply. Inflow of scrap has been on the decrease for some time with the exception of industrial scrap which due to sustained production levels continues to flow. All civilian collections have not been consumed but seem likely to be in the next month or six weeks. Proceeds of the steel salesmen's drive have been excellent but not high in tonnage as many plants have been well picked over for dormant scrap. Their drive netted mostly installations and materials chalked-marked "scrap" because usefulness could not be seen in the next 90 days.

o

NEW YORK—The holidays and cold weather have slowed collections and shipments and have given Eastern mills time to catch up with their stocks. They are no longer holding up shipments. A large part of the scrap in this area, however, continues to go west on allocations.

o

PITTSBURGH—Scrap conditions here as the year was closing were changed but little from a few weeks ago. Allocations are still responsible for enough scrap reaching this center to enable current production. Supplies are not as plentiful as a few weeks ago owing to severe cold weather.

•

CHICAGO — Shipments to consumers and yard receipts are both showing a small decrease here. The recent cold spells are undoubtedly a factor in the latter situation. The decline in shipments to consumers is a logical development, since the heavy shipments of a month ago were based on both consumption needs and inventory building needs. Now that inventories have been built up somewhat, shipments are tending to seek the consumption level. Charges of supercritical grading of scrap are high lighted by the new court suit instigated by OPA against Carnegie-Illinois Steel Corp. Such actions are undoubtedly a greater spur for close grading and high rate of rejections than any other factor. The local chapter of the Institute of Scrap Iron and Steel recently met here to discuss the manpower question. The yards' working forces are steadily diminishing and it is the feeling that action by Washington is imperative before the situation gets beyond help.

BOSTON—A sizable percentage of accumulated New England salvage scrap is unuseable, says the trade. When the salvage drive started, yards were given to understand they would be required to accept a certain tonnage, regardless, at $7 a net ton delivered or $5 a ton handled by the yards. Few yards went through with this plan. Instead they set aside certain space in their yards for storage of salvage material on a non-payment basis. Those yards having sufficient labor and equipment are processing the material and refunding city or town money derived from sale of the scrap after deducting processing and other charges.

Some yards without proper processing equipment are reported letting the material rest in a stock pile, which possibly is the answer to the lack of collections at primary collection points throughout New England.

•

Power House Scrapped

Philadelphia

• • • **The abandoned** power house of the Philadelphia Transportation Co. at Delaware Avenue and Laurel Street will be demolished to make available to the government 1500 tons of steel scrap in the property.

Industrial Milestone

• • • **Next year** marks the 50th year of business for the Oster Mfg. Co., of Cleveland, manufacturers of pipe and bolt threading equipment and turret lathes. It was founded in 1893 by the late Herman W. Oster and Russell B. Tewksbury.

Its original quarters, a modest, one-story work shop soon grew into a modern, well equipped plant. In 1929, a merger was effected with the Williams Tool Corp. giving Oster two additional plants, one in Erie, Pa., and the other in Brantford, Ont., Canada.

Succeeding his father, the late R. B. Tewksbury, in 1937, Roger Tewksbury became president and treasurer of the company and at the same time Arthur S. Gould, formerly secretary, became vice-president. Harry A. Maurer, long associated with Oster as general superintendent, assumed the secretaryship, the position he now holds along with the other two officers.

It's a good spring that wears out from old age. Many springs may grow old before their time because of unnoticed surface defects. Burrs, seams, pitting, cracks — all contribute to early spring failure — unless care in manufacture and laboratory inspection weeds them out. Surface defects often invite corrosion — also a contributing factor to a short life. Here at Dunbar's, spring materials are inspected, analyzed — before manufacture. All the way through, great pains are taken to waylay defects before they reach your assembly line. It's just this kind of care that earns for Dunbar a reputation for springs of better quality — long life.

"Quality Springs Since 1845"

Dunbar Bros. Co., Bristol, Connecticut

DIVISION OF ASSOCIATED SPRING CORPORATION

IRON AND STEEL (OTHER THAN RAILROAD) SCRAP

(All Prices Are Per Gross Ton)

	BASIC OPEN HEARTH GRADES (No. 1 Heavy Melting; No. 1 Hydr. Compressed Black Sheets, No. 2 Heavy Melting; Dealers' No. 1 Bundles; Dealers' No. 2 Bundles; No. 1 Busheling)	Unbaled* Machine Shop Turnings	BLAST FURNACE GRADES (Mixed Borings and Turnings; Shovelling Turnings; No. 2 Busheling; Cast Iron Borings)	No. 2 Busheling	ELECTRIC FURNACE, ACID OPEN HEARTH AND FOUNDRY GRADES										
					Low Phos.		Heavy Structural and Plate			Cut Auto Steel Scrap					
					Billet, Bloom, Forge Crops	Bar Crops, Punchings Plate Scrap and Cast Steel	3 ft. and Under	2 ft. and Under	1 ft. and Under	3 ft. and Under	2 ft. and Under	1 ft. and Under and Auto. Springs, and Crankshafts	Alloy Free Low Phos. and Sulphur Turnings	Heavy Axle and Forge Turn. First Cut	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Monessen, Midland, Johnstown, Sharon, Canton, Steubenville, Warren, Youngstown, Weirton	$20.00	$16.00	$16.00	$17.50	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Cleveland, Middletown, Cincinnati, Portsmouth	19.50	15.50	15.50	17.00	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Chicago, Claymont, Coatesville, Conshohocken, Harrisburg, Phoenixville, Sparrows Pt.	18.75	14.75	14.75	16.25	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Ashland, Ky.	19.50	15.50	15.50	17.00	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Buffalo, N. Y.	19.25	15.25	15.25	16.75	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Bethlehem, Pa.; Kokomo, Ind.	18.25	14.25	14.25	15.75	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth, Minn.	18.00	14.00	14.00	15.50	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
Detroit, Mich.	17.85	13.85	13.85	15.35	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo, Ohio	....	13.85	13.85	15.35	....	....	....	....	....	....	....	....	....	....	....
St. Louis, Mo.	17.50	13.50	13.50	15.00	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Atlanta, Ga.; Alabama City, Ala.; Birmingham, Los Angeles; MPittsburgh, Cal.; San Francisco	17.00	13.00	13.00	14.50	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
innequa, Colo.	16.50	12.50	12.50	14.00	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle, Wash.	14.50	10.50	10.50	12.00	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.00	12.50	14.00	15.50

***Baled turnings are $4 per gross ton higher. Dealers may charge $2 per ton for crushing other than heavy turnings. An industrial producer may charge $1.**

BUNDLES: Tin can bundles are $4 below dealers' No. 2 bundles; No. 3 bundles are $2 less than No. 1 heavy melting.

AT NEW YORK city or Brooklyn, the maximum shipping point price is $15.33 for No. 1 heavy melting, f.o.b. cars, f.a.s. vessel or loaded on truck. Other grades carry differentials similar to those in table. New Jersey prices must be computed on basis of all-rail. At Boston the maximum is $15.05 for No. 1 f.o.b. cars, f.a.s. vessel or loaded on trucks. Shipments from a New England shipping point to a consumer outside New England carry maximum transportation charge of $6.65 per ton.

SWITCHING CHARGES: Deductions for shipping points within basing points (cents per gross ton) are: Pittsburgh, Brackenridge, 55c.; Midland, Johnstown, Sharon, Youngstown, Warren, Weirton, Cleveland, Toledo, Los Angeles, San Francisco, 42c.; Butler, Monessen, Canton, Steubenville, Cincinnati*, Portsmouth, Ashland, Coatesville, Harrisburg, Phoenixville, Bethlehem, Kokomo, Duluth, St. Louis, 28c.; Buffalo, Claymont, 36c.; Conshohocken, 11c.; Atlanta, Birmingham, 32c.; Pittsburg, Cal., 42c.; Middletown, 14c.; Sparrow's Point, 11c.; Chicago, 84c.; Detroit, 53c.; Alabama City, 26c.; Minnequa, 22c.; Seattle, 38c. *At Cincinnati, for basic open hearth grades, cut auto scrap and auto springs and crankshafts, deduct 80c. per ton.

PITTSBURGH basing point includes switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Cincinnati basing point includes Newport, Ky., switching district. St. Louis includes switching districts of Granite City, East St. Louis, Madison, Ill. San Francisco includes switching districts of S. San Francisco, Niles and Oakland, Cal.

MAXIMUM prices of inferior grades shall continue to bear same differential below corresponding grades as existed during the period Sept. 1, 1940, to Jan. 31, 1941. Superior grades cannot be sold at a premium without approval of OPA. Special preparation charges in excess of the above prices are banned. Whenever any electric furnace or foundry grades are purchased for open hearth or blast furnace use, prices may not exceed the prices above for the corresponding open hearth grades.

MAXIMUM SHIPPING POINT PRICE—Where shipment is by rail or vessel, or by combination of rail and vessel, the scrap is at its shipping point when placed f.o.b. railroad car or f.a.s. vessel. In such cases, the maximum shipping point prices shall be: (a) For shipping points located within a basing point, the price listed in the table above for the scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point and (b) for shipping points located outside the basing point, the price in table above at the most favorable basing point minus the lowest transportation charge by rail or water or combination thereof. In lieu of dock charge add 75c. a ton*, but 50c. if moved by deck scow or railroad lighter. Shipping by motor vehicle: The scrap is at its shipping point when loaded. For shipping points located within basing points take price listed in table minus applicable switching charge. If located outside a basing point, the price at the most favorable basing point minus lowest established charge for transporting by common carrier. If no established transportation rate exists, the customary costs are deducted. Published dock charges prevail. If unpublished include 75c.* For exceptions see official order.

UNPREPARED SCRAP: For unprepared scrap, maximum prices shall be $2.50 (and in the case of the material from which No. 1, No. 2, and No. 3 bundles are made $4) less the maximum prices for the corresponding grade or grades of prepared scrap. In no case, however, shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Converter may charge $2.50 per ton on consumer-owned unprepared remote scrap (see order). A preparation-in-transit charge for allocated unprepared scrap is provided.

Maximum price of all scrap in a vehicle is that of the lowest price grade in the shipment. This limitation does not apply to vessel shipments if grades are segregated.

Where scrap is to undergo preparation prior to its arrival at the point of delivery, such scrap is not at its shipping point, as that phrase is defined above, until after preparation has been completed. For special preparation charges, consult official order.

CHEMICAL BORINGS: No. 1 (new, clean, containing not more than 1 per cent oil), $1 less than No. 1 heavy melting; No. 2 (new, clean, containing not more than 1.5 per cent oil), $2 less than No. 1 heavy melting. If loaded in box cars add 75c.

UNPREPARED CAST IRON SCRAP—Except for heavy breakable cast, unprepared scrap is given a price ceiling of $2.50 per ton less than the maximum prices for the corresponding grade of prepared cast iron scrap. Where scrap is to undergo preparation prior to arrival at the point of delivery, such scrap is not considered at shipping point until preparation is completed.

Consumers of cast scrap may pay the shipping point price plus established charge for transporting the scrap to their plants. In the case of deliveries by truck, the cast scrap buyer must obtain from the seller a certification, made out to OPA.

*At Memphis 50c.; Great Lakes ports $1; New England $1.25.

RAILROAD SCRAP

	No. 1 RR Heavy Melting	Scrap Rails	Rails for Rerolling	Scrap Rails: 3 ft. and Under	Scrap Rails: 2 ft. and Under	Scrap Rails: 18 in. and Under
Cleveland, Cincinnati, Ashland, Portsmouth, Middletown	$20.50	$21.50	$23.00	$23.50	$23.75	$24.00
Canton, Pittsburgh Sharon, Steubenville, Wheeling, Youngstown	21.00	22.00	23.50	24.00	24.25	24.50
Chicago, Philadelphia, Sparrows Pt., Wilmington	19.75	20.75	22.25	22.75	23.00	23.25
Birmingham, Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
Kokomo, Ind.	19.25	20.25	21.75	22.25	22.50	22.75
Seattle	15.50	16.50	18.00	18.50	18.75	19.00
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00

CAST IRON SCRAP

	Group A	Group B	Group C
No. 1 cupola cast	$18.00	$19.00	$20.00
No. 1 machinery cast, drop broken, 150 lbs. and under	18.00	19.00	20.00
Clean auto cast	18.00	19.00	20.00
Unstripped motor blocks	17.50	18.50	19.50
Stove Plate	17.00	18.00	19.00
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Misc. Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas Oklahoma, Texas and Florida.

Group C: States not named in A and B; switching district of Kansas City, Kan., Mo.

Engineering Construction Lowest Weekly for Year

New York

• • • **Engineering construction** volume for the short week due to the Christmas holiday totals $33,377,000. This is the lowest weekly volume reported during 1942. It compares with $75,539,000 recorded for the full preceding week, and is 34 per cent below the total for the corresponding short week in 1941, according to *Engineering News-Record.*

Federal work is 8 per cent below the week last year, and this decline coupled with the 91 per cent drop in state and municipal work, brings public construction 26 per cent under its last year's mark. Private work, accounting for $513,000 in the current week, is 91 per cent below a year ago.

Engineering construction volume for 1942 to date, $9,229,534,000, is 57 per cent above the total for the 52 weeks of 1941. Private volume for the 1942 52-week period, $552,838,000 is 53 per cent below last year, but public construction, $8,676,696,000, is 85 per cent higher than a year ago as a result of the 133 per cent gain in federal work.

War Trends Affect Civilian Steel Supply

Chicago

• • • **Military needs** and Lend-Lease shipments are subject to such great fluctuations as the war develops that it is impossible to determine the exact tonnage of steel that can be made available for other than war uses, H. H. Straus, vice-president of Inland Steel Co. last week told members of the National Association of Bedding Manufacturers meeting at the Palmer House here.

Discussing rerolling mills which normally produce a large share of parts of a bed, Mr. Straus said that all 18 rail steel mills in this country are now looking for business. While earlier this year it was difficult to obtain rerolling rails due to the fact that these rails were being relaid at war plants, this situation does not exist currently and all these mills now have a substantial inventory of raw material, but no customers.

Mr. Straus suggested that as long as this steel is available and cannot be used for other products due to the WPB limitation orders, it could be used to make army cots. These mills have the raw materials, the trained tongsmen and specialized workers, many of whom are seeking other employment due to the erratic schedules of rerolling mills.

Wire manufacturers, Mr. Straus reported, are in need of additional orders to finish this year's production schedules. At the present time, due mainly to suspension of some Lend-Lease shipments, spring wire is available on reasonably prompt shipment on AA-5 ratings. Recently wire manufacturers were directed to make a limited tonnage of farm fence. Prior to December, no fence was being produced. Mr. Straus said he thought this development was encouraging as it indicated that if the authorities deem a product of sufficient importance, the restrictions may be lifted and more wire made available.

Higgins Finally Receives Army Cargo Plane Contract

Washington

• • • **The contract for 1200** cargo planes to be built by Andrew J. Higgins, announced about two months ago, has finally come to light and DPC has found a way to make his Louisiana shipyards available to Higgins for conversion to this task.

It was learned here this week that the War Department had actually signed the contract at Wright Field, Dayton, Ohio, although no public announcement has been made.

The Higgins shipyards have been leased to Higgins by the DPC for $1 a year following an involved transaction whereby the Maritime Commission, previous owners, transferred the yards to the War Department, who transferred them to the DPC, who in turn leased them.

The yards were stopped in the middle of their construction some time ago but are now to be converted to plane production. DPC is about to sign a contract with Higgins for $23 million in machinery and equipment. This contract plus the Army's plane construction contract are said to total about $200 million. The contract is said to call for completion of the first plane by next October.

Canada Cancels All Conventions

Toronto

• • • **Recognizing the need** for conservation of steel, fuel and manpower, and the need for giving priority to the movement of war materials and armed forces, scores of associations have cancelled conventions scheduled to be held in Canadian centres during the coming year, Minister of Munitions Howe, announced. Mr. Howe stated "already the Transport Controller has received notice of cancellation of more than 50 per cent of the conventions originally scheduled for the latter part of 1942 for for 1943. Almost every day additional letters are received indicating that various groups intend to postpone the holding of conventions until after the war."

Enlarged Plane Award Announced for Higgins

• • • **A War Department** announcement of last week increased the apparent size of the cargo plane contract recently announced for Andrew J. Higgins from 1200 planes to "a large number." The official announcement said the contract would involve an outlay of more than $5-million.

The plane, which is to be built by Higgins in the Louisiana shipyards once sponsored for him by the Maritime Commission, will be of the C-76 type which is the Curtiss Caravan, a huge plywood plane fitted with a large freight door and capable of carrying about a 50 ton freight load. Higgins is said to have won the contract by showing how he could apply wood construction to the major portion of the plane. The contract was let on a cost-plus fixed-fee basis.

Contract for Ships Awarded

Toronto

• • • **Port Arthur** Shipbuilding Co., Ltd., Port Arthur, has been awarded a contract for construction of minesweepers by the Department of Munitions and Supply valued at $5,000,000 according to Gordon F. McDougall, general manager. Mr. McDougall stated that materials for the minesweepers would be assembled during the winter and construction work started in the spring, as work on the present contract nears completion.

Composite Prices . . .

Advances Over Past Week in **Heavy Type**; Declines in *Italics*. [Prices Are F.O.B. Major Basing Points]

Flat Rolled Steel: (Cents Per Lb.)	Dec. 28, 1942	Dec. 21, 1942	Dec. 1, 1942	Dec. 29, 1941
Hot rolled sheets	2.10	2.10	2.10	2.10
Cold rolled sheets	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.50	3.50	3.50	3.50
Hot rolled strip	2.10	2.10	2.10	2.10
Cold rolled strip	2.80	2.80	2.80	2.80
Plates	2.10	2.10	2.10	2.10
Plates, wrought iron	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00
Tin and Terne Plate: (Dollars Per Base Box)				
Tin plate, standard cokes	$5.00	$5.00	$5.00	$5.00
Tin plate, electrolytic	4.50	4.50	4.50	4.50
Special coated mfg. ternes	4.30	4.30	4.30	4.30
Bars and Shapes: (Cents Per Lb.)				
Merchant bars	2.15	2.15	2.15	2.15
Cold finished bars	2.65	2.65	2.65	2.65
Alloy bars	2.70	2.70	2.70	2.70
Structural shapes	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars	4.40	4.40	4.40	4.40
Wire and Wire Products: (Cents Per Lb.)				
Plain wire	2.60	2.60	2.60	2.60
Wire nails	2.55	2.55	2.55	2.55
Rails: (Dollars Per Gross Ton)				
Heavy rails	$40.00	$40.00	$40.00	$40.00
Light rails	40.00	40.00	40.00	40.00
Semi-Finished Steel: (Dollars Per Gross Ton)				
Rerolling billets	$34.00	$34.00	$34.00	$34.00
Sheet bars	34.00	34.00	34.00	34.00
Slabs	34.00	34.00	34.00	34.00
Forging billets	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00
Wire Rods and Skelp: (Cents Per Lb.)				
Wire rods	2.00	2.00	2.00	2.00
Skelp (grvd)	1.90	1.90	1.90	1.90

Pig Iron: (Per Gross Ton)	Dec. 28, 1942	Dec. 21, 1942	Dec. 1, 1942	Dec. 29, 1941
No. 2 fdy., Philadelphia	$25.89	$25.89	$25.89	$25.84
No. 2, Valley furnace	24.00	24.00	24.00	24.00
No. 2, Southern Cin'ti	24.68	24.68	24.68	24.06
No. 2, Birmingham	20.38	20.38	20.38	20.38
No. 2, foundry, Chicago†	24.00	24.00	24.00	24.00
Basic, del'd eastern Pa.	25.39	25.39	25.39	25.34
Basic, Valley furnace	23.50	23.50	23.50	23.50
Malleable, Chicago†	24.00	24.00	24.00	24.00
Malleable, Valley	24.00	24.00	24.00	24.00
L. S. charcoal, Chicago	31.34	31.34	31.34	31.34
Ferromanganese‡	135.00	135.00	135.00	120.00

†The switching charge for delivery to foundries in the Chicago district is 60c. per ton.
‡For carlots at seaboard.

Scrap: (Per Gross Ton)				
Heavy melting steel, P'gh.	$20.00	$20.00	$20.00	$20.00
Heavy melt'g steel, Phila.	18.75	18.75	18.75	18.75
Heavy melt'g steel, Ch'go	18.75	18.75	18.75	18.75
No. 1 hy. comp. sheet, Det.	17.85	17.85	17.85	17.85
Low phos. plate, Youngs'n	22.50	22.50	22.50	23.00
No. 1 cast, Pittsburgh	20.00	20.00	20.00	22.00
No. 1 cast, Philadelphia	20.00	20.00	20.00	24.00
No. 1 cast, Ch'go	20.00	20.00	20.00	20.00
Coke, Connellsville: (Per Net Ton at Oven)				
Furnace coke, prompt	$6.00	$6.00	$6.00	$6.125
Foundry coke, prompt	6.875	6.875	6.875	6.875
Non-Ferrous Metals: (Cents per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake, New York	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	5.70
Antimony (Asiatic), N. Y.	16.50	16.50	16.50	16.50

The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 98 to 102 herein.

Comparison of Prices . . .

	FINISHED STEEL	PIG IRON	SCRAP STEEL
Dec. 29, 1942	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One week ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One month ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton
One year ago	2.30467c. a Lb.	$23.61 a Gross Ton	$19.17 a Gross Ton

	FINISHED STEEL HIGH	FINISHED STEEL LOW	PIG IRON HIGH	PIG IRON LOW	SCRAP STEEL HIGH	SCRAP STEEL LOW
1942	2.30467c.,	2.30467c.,	$23.61	$23.61	$19.17	$19.17
1941	2.30467c.,	2.30467c.,	$23.61, Mar. 20	$23.45, Jan. 2	$22.00, Jan. 7	$19.17, Apr. 10
1940	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 23	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 9
1936	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931	1.99629c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, beams, tank plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Southern iron at Cincinnati.

Based on No. 1 heavy melting steel scrap quotations to consumers at Pittsburgh, Philadelphia and Chicago.

Prices of Finished Iron and Steel...

Steel prices shown here are f.o.b. basing points, in cents per lb., unless otherwise indicated. On some products either quantity deductions or quantity extras apply. In many cases gage, width, cutting, physical, chemical extras, etc., apply to the base price. Actual realized prices to the mill, therefore, are affected by extras, reductions, and in most cases freight absorbed to meet competition. Delivered prices do not reflect new 3 per cent tax on freight rates.

Basing Point → / Product ↓	Pittsburgh	Chicago	Gary	Cleveland	Birmingham	Buffalo	Youngstown	Sparrows Point	Granite City	Middletown, Ohio	Gulf Ports, Cars	Pacific Ports, Cars[10]	DELIVERED TO Detroit	New York	Philadelphia
SHEETS															
Hot rolled	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢	2.20¢	2.10¢		2.65¢	2.22¢	2.35¢	2.28¢
Cold rolled[1]	3.05¢	3.05¢	3.05¢	3.05¢		3.05¢	3.05¢		3.15¢	3.05¢		3.70¢	3.17¢	3.41¢	3.39¢
Galvanized (24 ga.)	3.50¢	3.50¢	3.50¢		3.50¢	3.50¢	3.50¢	3.50¢	3.60¢	3.50¢		4.05¢		3.75¢	3.68¢
Enameling (20 ga.)	3.35¢	3.35¢	3.35¢	3.35¢			3.35¢		3.45¢	3.35¢		4.00¢	3.47¢	3.73¢	3.69¢
Long ternes[2]	3.80¢		3.80¢									4.55¢		4.18¢	4.14¢
STRIP															
Hot rolled[3]	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢		2.75¢	2.22¢	2.48¢	
Cold rolled[4]	2.80¢	2.90¢		2.80¢			2.80¢	(Worcester = 3.00¢)					2.92¢	3.18¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢							2.58¢	
Commodity C-R	2.95¢			2.95¢			2.95¢	(Worcester = 3.35¢)					3.07¢	3.33¢	
TIN MILL PRODUCTS															
Coke tin plate, base box	$5.00	$5.00	$5.00						$5.10					5.38¢	5.34¢
Electrolytic tin plate, box	$4.50		$4.50												
Black plate, 29 gage[5]	3.05¢	3.05¢	3.05¢						3.15¢			4.05¢[12]			3.39¢
Mfg. ternes, special box	$4.30	$4.30	$4.30						$4.40						
BARS															
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth = 2.25¢)			2.52¢	2.80¢	2.27¢	2.51¢	2.49¢
Rail steel[6]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢					2.52¢	2.80¢			
Reinforcing (billet)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢			2.52¢	2.55¢[13]	2.27¢	2.40¢	
Reinforcing (rail)[7]	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.52¢	2.55¢[13]	2.27¢		2.49¢
Cold finished[8]	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit = 2.70c)					3.01¢	2.99¢
Alloy, hot rolled	2.70¢	2.70c				2.70¢	Bethlehem, Massillon, Canton = 2.70c)						2.82¢		
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢							3.47¢		
								(Coatesville and Claymont = 2.10¢)							
PLATES															
Carbon steel	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	2.25¢[11]		2.47¢	2.65¢	2.33¢	2.30¢	2.155¢
Floor plates	3.35¢	3.35¢									3.72¢	4.00¢		3.73¢	3.69¢
Alloy	3.50¢	3.50¢			(Coatesville = 3.50¢)						3.97¢	4.15¢		3.71¢	3.60¢
SHAPES															
Structural	2.10¢	2.10¢	2.10¢		2.10¢	2.10¢	(Bethlehem = 2.10¢)				2.47¢	2.75¢		2.28¢	2.22¢
SPRING STEEL, C-R															
0.26 to 0.50 Carbon	2.80¢			2.80¢			(Worcester = 3.00¢)								
0.51 to 0.75 Carbon	4.30¢			4.30¢			(Worcester = 4.50¢)								
0.76 to 1.00 Carbon	6.15¢			6.15¢			(Worcester = 6.35¢)								
1.01 to 1.25 Carbon	8.35¢			8.35¢			(Worcester = 8.55¢)								
WIRE[9]															
Bright[15]	2.60¢	2.60¢		2.60¢	2.60¢		(Worcester = 2.70c)					3.10¢			2.94¢
Galvanized	add proper size extra and galvanized extra to bright wire base, above.														
Spring (High Carbon)	3.20¢	3.20¢		3.20¢			(Worcester = 3.30¢)					3.70¢			3.54¢
PILING															
Steel sheet	2.40¢	2.40¢				2.40¢						2.95¢			2.74¢

[1] Mill run sheets are 10c. per 100 lb. less than base; and primes only, 25c. above base. [2] Unassorted 8-lb. coating. [3] Widths up to 12 in. [4] Carbon 0.25 per cent and less. [5] Applies to certain width and length limitations. [6] For merchant trade. [7] Prices for straight length material only, from a producer to a consumer. Functional discount of 25c. per 100 lb. to fabricators. [8] Also shafting. For quantities of 20,000 to 39,999 lb. [9] Carload lot to manufacturing trade. [10] These prices do not apply if the customary means of transportation (rail and water) are not used. [11] Ship plates only. [12] Boxed. [13] Portland and Seattle price, San Francisco price is 2.50c. [14] This bright wire base price to be used in figuring annealed and bright finish wires, commercial spring wire and galvanized wire.

GOVERNMENT CEILINGS—Price Schedule No. 6 issued April 16, 1941, governs steel mill prices; Price Schedule No. 49 governs warehouse prices, which are on another page of this issue.

EXCEPTIONS TO PRICE SCHEDULE No. 6—On hot rolled carbon bars, Phoenix Iron Co. may quote 2.35c. at established basing points; Calumet Steel division of Borg Warner may quote 2.35c., Chicago, on bars from its 8-in. mill; Joslyn Mfg. Co. may quote 2.35c., Chicago base. On rail steel bars Sweets Steel Co. may quote 2.33c., f.o.b. mill. On hot rolled sheets, Andrews Steel Co. may quote for shipment to Detroit area on Middletown base. On galvanized sheets, Andrews Steel may quote 3.75c., at established basing points. On hot rolled strip, Joslyn Mfg. Co. may quote 2.30c., Chicago base. On plates, Granite City Steel Co. may quote 2.35c., f.o.b. mill, and Central Iron & Steel Co. may quote 2.20c., f.o.b. basing points. On shapes, Phoenix Iron Co. may quote 2.30c. established basing points and 2.50c. Phoenixville for export.

On rail steel merchant bars, Eckels-Nye Corp. may charge 2.40c. On tubing, South Chester Tube Co. may price Gulf or Pacific Coast all-rail shipments and shipments west of Harrisburg on basis of f.o.b. Chester. On lend-lease sales to eastern seaboard, Sheffield Steel Co. and Colorado Fuel & Iron Corp. may sell f.o.b. mill. SEMIFINISHED STEEL—Follansbee Steel Corp. may sell forging billets at $49.50 f.o.b. Toronto; Continental Steel Corp. may sell Acme Steel Co. at $34 for rerolling billets plus extras and freight; Ford Motor Co. may sell rerolling billets at $34 f.o.b. Dearborn; Andrews Steel Co. may sell forging billets at $50 at established basing points and slabs at $41; Empire Sheet and Tin Plate may sell slabs at $41 at established basing points and sheet bars at $39 f.o.b. mill; on lend-lease sales Northwestern Steel & Wire Co. may charge $41 per gross ton f.o.b. mill for rerolling billets; on lend-lease sales Wheeling Steel Corp. may charge $36 per ton for small billets, f.o.b. Portsmouth and $37 per ton for sheet bars f.o.b. Portsmouth; Laclede Steel Co. on semifinished sales for lend-lease shipped to eastern seaboard may use Chicago basing point prices f.o.b. Alton and Madison, Ill. ALLOY STEEL BARS—Texas Steel Co. may use Chicago base f.o.b. Fort Worth.

SEMI-FINISHED STEEL

For exceptions, see preceding page

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are $2.25 higher; f.o.b. Duluth, billets only, $2 higher. Delivered prices do not reflect new per cent tax on freight rates.

	Per Gross Ton
Rerolling	$34.00
Forging quality	40.00

Alloy Steel: Pittsburgh, Chicago, Canton, Massillon, Buffalo, or Bethlehem, per gross ton..... $54.00

Shell Steel

	Per Gross Ton
3 in. to 12 in.	$52.00
12 in. to 18 in.	54.00
18 in. and over	56.00

Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are $2.25 higher.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point, Md.

	Per Gross Ton
Open hearth or bessemer	$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

	Per Lb.
Grooved, universal and sheared	1.90c.

Wire Rods

(No. 5 to 9/32 in.)

	Per Lb.
Pittsburgh, Chicago, Cleveland	2.00c.
Worcester, Mass.	2.10c.
Birmingham	2.00c.
San Francisco	2.50c.
Galveston	2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher. Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

	Base per lb.
High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57½c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi, 3c. higher.

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

	No. 304	No. 302
Forging billets	21.25c.	20.40c.
Bars	25.00c.	24.00c.
Plates	29.00c.	27.00c.
Structural shapes	25.00c.	24.00c.
Sheets	36.00c.	34.00c.
Hot rolled strip	23.50c.	21.50c.
Cold rolled strip	30.00c.	28.00c.
Drawn wire	25.00c.	24.00c.

Straight-Chromium Alloys

	No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.	23.375c.
Bars	18.50c.	19.00c.	22.50c.	27.50c.
Plates	21.50c.	22.00c.	25.50c.	30.50c.
Sheets	26.50c.	29.00c.	32.50c.	36.50c.
Hotstrip	17.00c.	17.50c.	24.00c.	35.00c.
Cold st.	22.00c.	22.50c.	32.00c.	52.00c.

Chromium-Nickel Clad Steel (20%)

	No. 304
Plates	18.00c.*
Sheets	19.00c.

*Includes annealing and pickling.

NATIONAL EMERGENCY STEELS (Hot Rolled)

Extras for Alloy Content

Designation	CHEMICAL COMPOSITION LIMITS, PER CENT								Basic Open-Hearth		Electric Furnace	
	Carbon	Manganese	Phosphorus Max.	Sulphur Max.	Silicon	Chromium	Nickel	Molybdenum	Bars and Bar Strip	Billets, Blooms and Slabs	Bars and Bar Strip	Billets, Blooms and Slabs
NE 1330	.28/ .33	1.60/1.90	.040	.040	.20/ .35				.10c	$2.00		
NE 1335	.33/ .38	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1340	.38/ .43	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1345	.43/ .48	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 1350	.48/ .53	1.60/1.90	.040	.040	.20/ .35				.10	2.00		
NE 8020	.18/ .23	1.00/1.30	.040	.040	.20/ .35			.10/ .20	.45	9.00	.95c	$19.00
NE 8442*	.40/ .45	1.30/1.60	.040	.040	.20/ .35			.30/ .40	.90	18.00	1.40	28.00
NE 8613	.12/ .17	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8615	.13/ .18	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8617	.15/ .20	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8620	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8630	.28/ .33	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	.15/ .25	.75	15.00	1.25	25.00
NE 8720	.18/ .23	.70/ .90	.040	.040	.20/ .35	.40/ .60	.40/ .70	20/. 30	.80	16.00	1.30	26.00
NE 9255	.50/ .60	.70/ .95	.040	.040	1.80/2.20				.40c	8.00		
NE 9260	.55/ .65	.75/1.00	.040	.040	1.80/2.20				.40	8.00		
NE 9262	.55/ .65	.75/1.00	.040	.040	1.80/2.20	.20/ .40			.65	13.00		
NE 9415	.13/ .18	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30c	$26.00
NE 9420	.18/ .23	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9422	.20/ .25	.80/1.10	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9430	.28/ .33	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9435	.33/ .38	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9437	.35/ .40	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9440	.38/ .43	.90/1.20	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.80	16.00	1.30	26.00
NE 9442	.40/ .45	1.00/1.30	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9445	.43/ .48	1.00/1.30	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9450	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.20/ .40	.20/ .50	.08/ .15	.85	17.00	1.35	27.00
NE 9537*	.35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9540*	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9542*	.40/ .45	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ .25	1.20	24.00	1.70	34.00
NE 9550*	.48/ .53	1.20/1.50	.040	.040	.40/ .60	.40/ .60	.40/ .70	.15/ 25	1.20	24.00	1.70	34.00
NE 9630	.28/ .33	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9635	.33/ .38	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9637	35/ .40	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9640	.38/ .43	1.20/1.50	.040	.040	.40/ .60	.40/ .60			.80	16.00	1.30	26.00
NE 9642	.40/ .45	1.30/1.60	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00
NE 9645	.43/ .48	1.30/1.60	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00
NE 9650	.48/ .53	1.30/1.60	.040	.040	.40/ .60	.40/ .60			.85	17.00	1.35	27.00

***Recommended for large sections only.**

Note: The extras shown above are in addition to a base price of 2.70c. per 100 lb., on finished products and $54 per gross ton on semi-finished steel major basing points and are in cents per 100 lb. and dollars per gross ton in semi-finished.

ELECTRICAL SHEETS

(Base, f.o.b. Pittsburgh)

	Per Lb.
Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.

F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham

	Base per Keg
Standard wire nails	$2.55
Coated nails	2.55
Cutnails, carloads	3.85
	Base per 100 Lb.
Annealed fence wire	$3.05
Annealed galvanized fence wire	3.40
	Base Column
Woven wire fence*	67
Fence posts (carloads)	69
Single loop bale ties	59
Galvanized barbed wire†	70
Twisted barbless wire	70

*15½ gage and heavier. †On 80-rod spools in carload quantities.

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

Standard rails, heavier than 60 lb., gross ton	$40.00
Angle bars, 100 lb.	2.70
(F.o.b. Basing Points)	*Per Gross Ton*
Light rails (from billets)	$40.00
Light rails (from rail steel)	39.00
	Base per Lb.
Cut spikes	3.00c.
Screw spikes	5.15c.
Tie plates, steel	2.15c.
Tie plates, Pacific Coast	2.30c.
Track bolts	4.75c.
Track bolts, heat treated, to railroads	5.00c.
Track bolts, jobbers discount	63-5

Basing Points, light rails—Pittsburgh, Chicago, Birmingham; spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo; spikes alone—Youngstown, Lebanon, Pa., Richmond.

ROOFING TERNE PLATE

(F.o.b. Pittsburgh, 112 Sheets)

	20x14 in.	20x28 in.
8-lb. coating I.C.	$6.00	$12.00
15-lb. coating I.C.	7.00	14.00
20-lb. coating I.C.	7.50	15.00

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

	Per Cent off List
½ in. & smaller x 6 in. & shorter	65½
9/16 & ⅝ in. x 6 in. & shorter	63½
¾ to 1 in. x 6 in. & shorter	61
1⅛ in. and larger, all length	59
All diameters over 6 in. long	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:

(Hexagon or Square)

½ in. and smaller	62
9/16 to 1 in. inclusive	59
1⅛ to 1½ in. inclusive	57
1⅝ in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts	**U.S.S.**	**S.A.E.**
7/16 in. and smaller	..	64
½ in. and smaller	62	..
½ in. through 1 in.	..	60
9/16 to 1 in.	59	..
1⅛ in. through 1½ in.	57	58
1⅝ in. and larger	56	..

In full container lots, 10 per cent additional discount.

Stove Bolts

Packages, nuts loose	71 and 10
In packages, with nuts attached	71
In bulk	80

On stove bolts freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets *(½ in. and larger)*

	Base per 100 lb.
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	$3.75

Small Rivets *(7/16 in. and smaller)*

	Per Cent Off List
F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham	65 and 5

Cap and Set Screws

	Per Cent Off List
Upset full fin. hexagon head cap screws, coarse or fine thread, up to and incl. 1 in. x 6 in.	64
Upset set screws, cup and oval points	71
Milled studs	46
Flat head cap screws, listed sizes	36
Fillister head cap, listed sizes	51

Freight allowed up to 65c. per 100 lb. based on Cleveland, Chicago or New York on lots of 200 lb. or over.

PIG IRON

All prices set in bold face type are maxima established by OPA on June 24, 1941. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maxima Delivered prices do not reflect new 3 per cent tax on freight rates.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston††	*$25.53*	*$25.03*	*$26.53*	*$26.03*	.....	.....
Brooklyn	*27.65*	.....	.....	*28.15*	.....	.....
Jersey City	*26.62*	*26.12*	*27.62*	*27.12*	.....	.....
Philadelphia	*25.89*	*25.39*	*26.89*	*26.39*	.....	.....
Bethlehem, Pa.	$25.00	$24.50	$26.00	$25.50	.....	.....
Everett, Mass.††	25.00	24.50	26.00	25.50	.....	.....
Swedeland, Pa.	25.00	24.50	26.00	25.50	.....	.....
Steelton, Pa.	.....	24.50	.....	.....	$29.50	.....
Birdsboro, Pa.	25.00	24.50	26.00	25.50	29.50	.....
Sparrows Point, Md.	25.00	24.50	.....	.....	.....	.....
Erie, Pa.	24.00	23.50	25.00	24.50	.....	.....
Neville Island, Pa.	24.00	23.50	24.50	24.00	.....	.....
Sharpsville, Pa.*	24.00	23.50	24.50	24.00	.....	.....
Buffalo	24.00	23.00	25.00	24.50	29.50	.....
Cincinnati	*24.68*	*24.68*	.....	*25.18*	.....	.....
Canton, Ohio	*25.47*	*24.97*	*25.97*	*25.47*	.....	.....
Mansfield, Ohio	*26.06*	*25.56*	*26.56*	*26.06*	.....	.....
St. Louis	*24.50*	*24.00*	.....	.....	.....	.....
Chicago	24.00	23.50	24.50	24.00	.....	*$31.34*
Granite City, Ill.	24.00	23.50	24.50	24.00	.....	.....
Cleveland	24.00	23.50	24.50	24.00	.....	.....
Hamilton, Ohio	24.00	23.50	.....	24.00	.....	.....
Toledo	24.00	23.50	24.50	24.00	.....	.....
Youngstown*	24.00	23.50	24.50	24.00	.....	.....
Detroit	24.00	23.50	24.50	24.00	.....	.....
Lake Superior fc.	.....	.....	.....	.....	.....	$28.00
Lyles, Tenn. fc.†	.....	.....	.....	.....	.....	33.00
St. Paul	*26.76*	.....	*27.26*	*26.76*	.....	.....
Duluth	24.50	24.00	25.00	24.50	.....	.....
Birmingham	20.38	19.00	25.00	.....	.....	.....
Los Angeles	*27.25*	.....	.....	.....	.....	.....
San Francisco	*27.25*	.....	.....	.....	.....	.....
Seattle	*27.25*	.....	.....	.....	.....	.....
Provo, Utah	22.00	.....	.....	.....	.....	.....
Montreal	*27.50*	*27.50*	.....	*28.00*	.....	.....
Toronto	*25.50*	*25.50*	.....	*26.00*	.....	.....

GRAY FORGE IRON: Valley or Pittsburgh furnace $23.50

*Pittsburgh Coke & Iron Co. (Sharpsville, Pa., furnace only) and the Struthers Iron and Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

**Pittsburgh Ferromanganese Co. (Chester furnace only) may charge $2.25 a ton over maximum basing point prices.

†Price shown is for low-phosphorous iron; high-phosphorous sells for $28.50 at the furnace.

††Eastern Gas & Fuel Associates, Boston, is permitted to sell pig iron produced by its selling company, Mystic Iron Works, Everett, Mass., at $1 per gross ton above maximum prices.

Delta Chemical & Iron Co., Chicago, may charge $30 for charcoal iron at its Delta, Mich., furnace.

Basing point prices are subject to switching charges; silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 per cent to 2.25 per cent); phosphorous differentials, a reduction of 38c. per ton for phosphorous content of 0.70 per cent and over; manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent.

WAREHOUSE PRICES

(Delivered Metropolitan areas, per 100 lb. These prices do not necessarily apply for dislocated tonnage shipments when the f.o.b. City prices are used in conformance with OPA Schedule 49)

CITIES	SHEETS			STRIP		Plates (¼ in. and heavier)	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 ga.)	Cold Rolled	Galv. (24 ga.)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled 2300	Hot Rolled 3100	Cold Drawn 2300	Cold Drawn 3100
Pittsburgh	$3.35	.....	$4.65	$3.60	$3.20	$3.40	$3.40	$3.35	$3.65	$7.45	$5.75	$8.40	$6.75
Chicago	3.25	$4.10	4.85[1]	3.60	3.50	3.55	3.55	3.50	3.75	7.35	5.65	8.40	6.75
Cleveland	3.35	4.05	4.62	3.50	3.20	3.40	3.58	3.25	3.75	7.55	5.85	8.40	6.75
Philadelphia	3.55	4.05[5]	4.65	3.51	3.31	3.55	3.55	3.85	4.06	7.31	5.86	8.56	7.18
New York	3.58	4.60[2]	5.00	3.96[6]	3.51	3.76	3.75	3.84	4.09	7.60	5.90	8.84	7.19
Detroit	3.43	4.30	4.84[1]	3.68*	3.40	3.60	3.65	3.43	3.80	7.67	5.97	8.70	7.05
Buffalo	3.25	4.30[1]	4.75[4]	3.82	3.52	3.62	3.40	3.35	3.75	7.35	5.65	8.40	6.75
Boston	3.71	4.68	5.11	4 06	3.46	3.85	3.85	3.98	4.13	7.77	6.07	8.91	7.28
Birmingham	3.45[3]	.....	4.75[1]	3.70[3]	.....	3.55[3]	3.55[3]	3.50[3]	4.48	.....	.....	.....	.....
St. Louis	3.39	4.24[2]	4.99[1]	3.74	3.61	3.69	3.69	3.64	4.02	7.72	6.02	8.77	7.12
St. Paul	3.50	4.35	5.00	3.85	3.83	3.80	3.80	3.75	4.34	7.45	6.00	8.84	7.44
Milwaukee	3.38	4.23[2]	4.98[1]	3.73	3.54	3.68	3.68	3.63	3.88	7.58	5.88	8.63	6.98
Baltimore	3.50	.....	5.05	4.00	.....	3.70	3.70	3.85	4.04	.....	.....	.....	.....
Cincinnati	3.42	4.37[2]	4.42[1]	3.67	3.45	3.65	3.68	3.60	4.00	7.69	5.99	8.50	7.10
Norfolk	3.85	.....	5.40	4.10	.....	4.05	4.05	4.00	4.15	.....	.....	.....	.....
Washington	3.60	.....	.....	4.10	.....	3.80	3.80	3.95	4.10	.....	.....	.....	.....
Indianapolis	3.45	4.25	5.01[1]	3.75	3.28	3.70	3.70	3.60	3.97	7.67	5.97	8.72	7.07
Omaha	3.85	.....	5.52[1]	4.20	.....	4.15	4.15	4.10	4.42	.....	.....	.....	.....
Memphis	3.85	.....	5.25	4.10	.....	3.95	3.95	3.90	4.31	.....	.....	.....	.....
New Orleans	4.05	.....	.....	4.30	.....	3.90	3.90	4.10	4.60	.....	.....	.....	.....
Houston	4.00	.....	.....	4.30	.....	4.05	4.05	3.75	.....	.....	.....	.....	.....
Los Angeles†	4.95	7.15	5.95	4.90	.....	4.90	4.60	4.35	6.60	9.55	8.55	10.55	9.55
San Francisco†	4.55	7.05	6.10	4.50	.....	4.65	4.35	3.95	6.80	9.80	8.80	10.80	9.80
Seattle†	4.65[7]	.....	5.70[7]	4.25	.....	4.75	4.45	4.20	5.75	.....	8.00	.....	.....

BASE QUANTITIES: Hot rolled sheets, cold rolled sheets, hot rolled strip, plates, shapes and hot rolled bars, 400 to 1999 lb., galvanized sheets, 150 to 1499 lb.; cold rolled strip, extras apply on all quantities; cold finished bars, 1500 lb. and over; SAE bars, 1000 lb. and over. Exceptions: [1] 500 to 1499 lb. [2] 400 to 1499 lb. [3] 400 to 3999 lb. [4] 450 to 1499 lb. [5] 1000 to 1999 lb. [6] 0 to 1999 lb. [7] 300 to 10,000 lb. At Philadelphia galvanized sheets, 25 or more bundles; Boston, cold rolled and galvanized sheets, 450 to 3749 lb.; San Francisco, hot rolled sheets, 400 to 39,999 lb., galvanized and cold rolled sheets, 750 to 4999 lb., cold fin. bars, 0-299 lb.; hot rolled alloy bars, 0-4999 lb.; Seattle, cold finished bars, 1000 lb. and over, hot rolled alloy bars, 0-1999 lb.; Memphis, hot rolled sheets, 400 to 1999 lb., galvanized sheets, 150 and over; St. Paul, galvanized and cold rolled sheets, any quantity, hot rolled bars, plates, shapes, hot rolled sheets, 400 to 14,999 lb.; Los Angeles, hot rolled sheets, bars, plates, cold rolled sheets, 300 to 1999 lb.; galvanized sheets, 1 to 6 bundles; cold finished bars, 1 to 99 lb.; SAE bars, 100 lb. Extras for size, quality, etc., apply on above quotations. * 12 gage and heavier, $3.43. † Los Angeles, San Francisco and Seattle prices reflect special provisions of amendment No. 2 to OPA Price Schedule No. 49.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes Minimum Wall

(Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots)

	Seamless Cold Drawn	Hot Rolled	Lap Weld, Hot Rolled
2 in. o.d. 13 B.W.G.	15.03	13.04	12.38
2½ in. o.d. 12 B.W.G.	20.21	17.54	16.58
3 in. o.d. 12 B.W.G.	22.48	19.50	18.35
3½ in. o.d. 11 B.W.G.	28.37	24.62	23.15
4 in. o.d. 10 B.W.G.	35.20	30.54	28.66

(Extras for less carload quantities)

40,000 lb. or ft. over	Base
30,000 lb. or ft. to 39,999 lb. or ft.	5%
20,000 lb. or ft. to 29,999 lb. or ft.	10%
10,000 lb. or ft. to 19,999 lb. or ft.	20%
5,000 lb. or ft. to 9,999 lb. or ft.	30%
2,000 lb. or ft. to 4,999 lb. or ft.	45%
Under 2,000 lb. or ft.	65%

CAST IRON WATER PIPE

	Per Net Ton
6-in. and larger, del'd Chicago	$54.80
6-in. and larger, del'd New York	52.20
6-in. and larger, Birmingham	46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles	69.40
6-in. and larger f.o.b. cars, Seattle	71.20

Class "A" and gas pipe, $3 extra; 4-in. pipe is $3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger is $45 at Birmingham and $53.80 delivered Chicago. $59.40 at San Francisco and Los Angeles, and $70.20 at Seattle. Delivered prices do not reflect new 3 per cent tax on freight rates.

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

(F.o.b. Pittsburgh only on wrought pipe)
Base Price—$200 per Net Ton

Steel (Butt Weld)

	Black	Galv.
⅛ in.	63½	51
¼ in.	66½	55
⅜ to 3 in.	68½	57½

Wrought Iron (Butt Weld)

⅛ in.	25	3½
¼ in.	30	10
⅜ and 1¼ in.	34	16
1½ in.	38	18½
2 in.	37½	18

Steel (Lap Weld)

2 in.	61	49½
2½ and 3 in.	64	52½
3½ to 6 in.	66	54½

Wrought Iron (Lap Weld)

2 in.	30½	12
2½ to 3½ in.	31½	14½
4 in.	33½	18
4½ to 8 in.	32½	17

Steel (Butt, extra strong, plain ends)

	Black	Galv.
⅛ in.	61½	50½
¼ in.	65½	54½
⅜ to 3 in.	67	57

Wrought Iron (Same as Above)

⅛ in.	25	6
¼ in.	31	12
⅜ to 2 in.	38	19½

Steel (Lap, extra strong, plain ends)

2 in.	59	48½
2½ and 3 in.	63	52½
3½ to 6 in.	66½	56

Wrought Iron (Same as Above)

2 in.	33½	15½
2½ to 4 in.	39	22½
4½ to 6 in.	37½	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.o.b. Gary prices are two points lower discount or $4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or $2 a ton higher on all butt weld.

Ferroalloys

Ferromanganese

F.o.b. New York, Philadelphia, Baltimore, Mobile or New Orleans, Domestic, 80%, per gross ton (carloads) $135.00

Spiegeleisen

Per Gross Ton Furnace

Domestic, 19 to 21%	$36.00
Domestic, 26 to 28%	49.50

Electric Ferrosilicon

(Per Gross Ton, Delivered Lump Size)

50% (carload lots, bulk)	$74.50
50% (ton lots, packed)	87.00
75% (carload lots, bulk)	135.00
75% (ton lots, packed)	151.00

Silvery Iron

(Per Gross Ton, base 6.00 to 6.50 Si)

F.o.b. Jackson, Ohio $29.50*
Buffalo 30.75*

For each additional 0.50% silicon add $1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add $1 a ton for 0.75% phosphorus or over.

*Official OPA price established June 24, 1941.

Bessemer Ferrosilicon

Prices are $1 a ton above Silvery Iron quotations of comparable analysis.

Ferrochrome

(Per Lb., Contained Cr, Delivered Carlots, Lump Size, on Contract)

4 to 6 carbon	13.00c.
2 carbon	19.50c.
1 carbon	20.50c.
0.10 carbon	22.50c.
0.06 carbon	23.00c.

Spot prices are ¼c. per lb. of contained chromium higher.

Silico-Manganese

(Per Gross Ton, Delivered, Carloads, Bulk)

3 carbon	$120.00
2.50 carbon	125.00
2 carbon	130.00
1 carbon	140.00

Other Ferroalloys

Ferrotungsten, per lb. contained W, del'd carload	$2.00
Ferrotungsten, 100 lb. and less	2.25
Ferrovanadium, contract, per lb. contained V, del'd	$2.70 to $2.90†
Ferrocolumbium, per lb. contained Cb, f.o.b. Niagara Falls, N. Y., ton lots	$2.25†
Ferrocarbontitanium, 15-18 Ti, 7-8 C, f.o.b. furnace, carload contract, net ton	$142.50
Ferrocarbontitanium, 17-20 Ti, 3-5 C, f.o.b. furnace, carload contract, net ton	$157.50
Ferrophosphorus, electric or blast furnace materials, carloads, f.o.b. Anniston, Ala., for 18%, with $3 unitage freight, equaled with Rockdale, Tenn., gross ton.	$58.50
Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Siglo), Tenn., $3 unitage, freight equalized with Nashville, gross ton	$75.00
Ferromolybdenum, per lb., Mo, f.o.b. furnace	95c.
Calcium molybdate, per lb. Mo, f.o.b. furnace	80c.
Molybdenum oxide briquettes 48-52 Mo, per lb. contained Mo, f.o.b. Langeloth, Pa.	80c.
Molybdenum oxide, in cans, per lb. contained Mo, f.o.b. Langeloth, and Washington, Pa.	80c.

*Spot prices are $5 per ton higher.
†Spot prices are 10c. per lb. of contained element higher.

LAKE SUPERIOR ORES

(51.50% Fe., Delivered Lower Lake Ports)

	Per Gross Ton
Old range, bessemer, 51.50	$4.75
Old range, non-bessemer, 51.50	4.60
Mesaba, bessemer, 51.50	4.60
Mesaba, non-bessemer, 51.50	4.45
High phosphorus, 51.50	4.35

COKE*

Furnace

	Per Net Ton
†Connellsville, prompt	$6.00

Foundry

†Connellsville, prompt	$6.75 to $7.00
By-product, Chicago	$12.25
By-product, New England	$13.75
By-product, Newark	$12.40 to $12.95
By-product, Philadelphia	$12.38
By-product, Cleveland	$12.30
By-product, Cincinnati	$11.75
By-product, Birmingham	$8.50†
By-product, St. Louis	$12.02
By-product, Buffalo	$12.50

*Maximum by-product coke prices established by OPA became effective Oct. 1, 1941. A complete schedule of the ceiling prices was published in THE IRON AGE, Sept. 25, 1941, p. 94B. Maximum beehive furnace coke prices established by OPA, Jan. 26. † F.O.B. oven.

Ceiling for operators of hand drawn ovens using trucked coal is $6.50.

FLUORSPAR

	Per Net Ton
Domestic washed gravel, 85-5 f.o.b. Kentucky and Illinois mines, all rail	$25.00
Domestic, f.o.b. Ohio River landing barges	25.00
No. 2 lump, 85-5 f.o.b. Kentucky and Illinois mines	25.00

REFRACTORIES

(F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	$64.60
First quality, Penna., Md., Ky., Mo. & Ill.	51.30
First quality, New Jersey	56.00
Second quality, Penna., Md., Ky., Mo. & Ill.	46.55
Second quality, New Jersey	51.00
No. 1, Ohio	43.00
Ground fire clay, net ton	7.60

Silica Brick

Pennsylvania & Birmingham	$51.30
Chicago District	58.90
Silica cement, net ton (Eastern)	9.00

Chrome Brick

	Per Net Ton
Standard or chemically bonded, Balt., Plymouth Meeting and Chester	$54.00

Magnesite Brick

Standard, Balt. and Chester	$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

Domestic, f.o.b. Balt. and Chester in sacks (carloads)	$44.00
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

METALS

From Republic's research and experience acquired through manufacture of "heavy-duty" war steels will come improved steels for more comfortable and efficient transportation equipment after the war.

WAR—Relentless Tester of Materials—Proves the Case for Alloy Steels

Today, the entire output of alloy steels—including the stainless analyses—is allocated to war effort.

—because alloy steels—the finest of steels—provide qualities found in no other material.

—because Army and Navy engineers, who know from tests and experience over many years what steels are best, specify these steels for vital parts of war equipment.

Alloy steels have the strength and toughness to withstand heaviest loads and most severe strains—to permit the use of smaller sections for reduction of weight or bulk.

Their resistance to abrasion and wear greatly lengthens life under trying conditions.

Their resistance to fatigue and to extremes of temperature insures against failures in vital applications.

Their resistance to corrosion and oxidation permits their economic use where other materials simply will not stand up.

But war is no respecter of claims. It demands

proof—results. And alloy steels are proving their superiority in airplanes, ships, tanks, motorized equipment, guns and countless other wartime items or the equipment which produces them.

War is a most relentless tester of steel—but it also creates the greatest demand for better steels. As a result, out of war always comes increased knowledge in steel making and application to make the peacetime world a better, safer, more comfortable place in which to live.

Republic Steel is acquiring this war knowledge rapidly and in volume. And Republic is adding it to the *UNEQUALLED* alloy steel experience already gained through decades of pioneering and leadership in the field of alloy steel manufacture.

It was Republic metallurgists who made the first commercially-successful heat of chromium-vanadium steel, produced the first successful nickel-molybdenum steel, issued the first grain size chart—who have continued to make similar epochal contributions to the science of alloying steel.

Republic's first obligation today is to produce the best steels possible in the greatest volume for war production.

And Republic is doing it!

—by working 'round the clock seven days a week.

—by tremendously increasing facilities, especially those for making alloy steels.

—by breaking more than 400 important monthly departmental production records in the past year and a half.

—by anticipating new demands and translating them,

Office and home appliances—everything made of steel—face a new era of development made possible through improvement made in Republic steels to meet war needs.

Now, bombers fly higher and farther with heavier loads—pursuit ships faster—thanks to Republic "aircraft quality" steels. Through war experience today commercial aviation will benefit tomorrow.

through results in the field and long hours in the laboratory, into better steels.

A man can work, do everything possible today and still think of the future. Republic has established a reputation for always doing that—for being ready whenever readiness was called for.

If Republic steels—alloy, stainless and carbon—did a good job for you before the war...if they're doing a good job today in your war effort...they'll do an even better job for you tomorrow when you return to the manufacture of automobiles, trucks, trains, civilian airplanes, refrigerators, radios, building structures, light and heavy machinery of all kinds—and when you again are faced with sharp competition in post-war markets.

If, for one reason or another, you are not a Republic customer, remember that Republic will be prepared to furnish you with an unusually complete line of steels and steel products, each developed to the highest degree obtainable at the time, each improved to the utmost ability of a proved leader in fine steels.

REPUBLIC STEEL

ALLOY STEEL DIVISION: MASSILLON, OHIO • GENERAL OFFICES: CLEVELAND, OHIO

Berger Manufacturing Division • Culvert Division • Niles Steel Products Division • Steel and Tubes Division
Union Drawn Steel Division • Truscon Steel Company • Export Department: Chrysler Building, New York, New York

ALLOY and CARBON STEELS • STAINLESS STEEL • PLATES • BARS and SHAPES • STRIP • SHEETS • PIPE and TUBING
TIN PLATE • NUTS • BOLTS • RIVETS • NAILS • PIG IRON • FARM FENCE • WIRE • FABRICATED STEEL PRODUCTS

Dig Up Every Scrap of BRASS

THE ARMED FORCES NEED IT NOW

GOOD brass scrap helps to make *new* brass faster. . . . It will help to catch up more rapidly with the crying need for munitions to supply millions of United Nations fighting men who are not supplied sufficiently, now, to give them an equal fighting chance against the accumulated supplies of the enemy.

This brass scrap must be had . . . for it is urgently needed on jobs that only brass can do.

In and around every industrial plant (and around home, too), a little systematic and intensive "bird-dogging" will turn up some scrap brass. *No amount is too small* . . . it will certainly be enough to fire a shot that may decide a battle on land, at sea, or in the air.

So have a "Brass Finders Committee" organized today. And when you have a fair-sized accumulation . . . *don't wait.* Call your local scrap dealer or industrial salvage organization. They'll do the rest.

Remember, brass scrap is *always* needed. Keep it coming — to "keep 'em firing." And remember, also, to buy war bonds . . . which buy bullets.

Bristol Brass

THE BRISTOL BRASS CORPORATION • BRISTOL, CONN.

Makers of Brass Since 1850

PUBLISHED IN COOPERATION WITH THE NATIONAL SCRAP METAL COLLECTION DRIVE

TITANIUM ALLOYS AVAILABLE

TAM
(F. C. T.) FERRO-CARBON-TITANIUM
FOR DEOXIDATION

TAM
40% FERRO-TITANIUM
FOR STAINLESS STEEL

TAM
FOUNDRY FERRO-TITANIUM
FOR IRON AND STEEL

There is ***no*** scarcity of TAM Titanium Alloys for the Iron and Steel Industries or TAM Zirconite Sand, Flour and Mold and Core Washes.

Our expanded manufacturing facilities enable us to fill orders for all requirements.

Find out about these TAM products. Visit the TAMCO exhibit in Booth A-336 at the National Metals Exposition October 12 to 16 in Cleveland. TAM's staff of experienced field engineers will gladly explain how you can benefit with TAM Titanium Alloys and Zirconite products.

REMEMBER to get the facts on TAM products at the National Metals Exposition October 12 to 16... Cleveland... Booth A-336

TITANIUM ALLOY MANUFACTURING CO.
GENERAL OFFICES AND WORKS: NIAGARA FALLS, N. Y., U. S. A.
EXECUTIVE OFFICES: 111 BROADWAY, NEW YORK CITY

TAM ZIRCONITE PRODUCTS AVAILABLE

TAM
Foundry Zirconite Sand (in three grades)
Melting Points from 3650° F to 3950° F

TAM
Foundry Zirconite Flour (in two grades)
Melting Points from 3650° F to 3812° F

TAM
Foundry Zirconite Mold and Core Washes (in three grades)
Super-refractory compounds with melting points from 3600° F to 3775° F

(ZIRCONITE PRODUCTS SHIPPED TO CANADA DUTY FREE)

Representatives for the Pacific Coast . . . . Balfour, Guthrie & Co., San Francisco, Los Angeles, Portland, Seattle, Tacoma
Representatives for Canada . . Railway & Power Eng. Corp., Ltd., Toronto, Montreal, Hamilton, Winnipeg, Vancouver, Sydney
Representatives for Europe . . . . . T. Rowlands & Co., Ltd., 23-27 Broomhall St., Sheffield, England

OUR ALLOYS MAKE

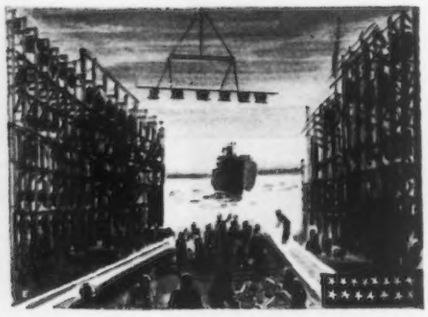
We are among America's principal producers of ferro alloys.

These alloys are required in the making of every pound of steel to fight the Axis.

Some of these alloys are used primarily to take impurities out of steel. For example, 50% Silicon, Titanium, and Alsifer.

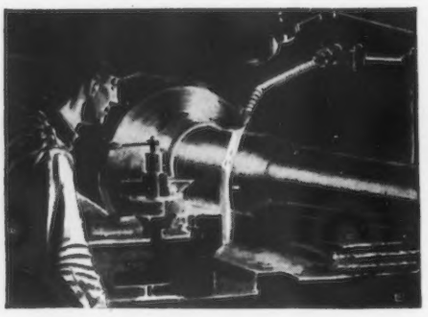
Other alloys are added to steel and iron to increase strength, hardness, resistance to shock, heat, wear, and other special properties. Such alloys are Vanadium, Chromium, 75-95% Silicon and various foundry alloys.

VANADIUM goes into the finest of all steels—to make armor plate, shafts for tanks, ships, airplanes. Vanadium is also indispensable for high speed tool steels that carve out guns, gears, shells. Then, too, vanadium springs, castings, heavy and light forgings are among the best in the world—now 100% at work to beat the Axis.



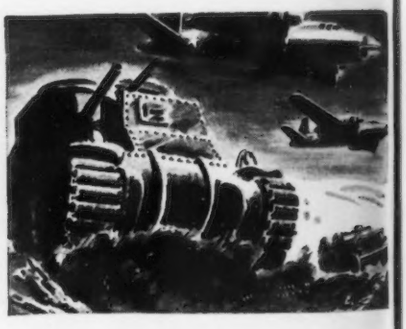
ALSIFER . . . . . .

(ferro-silicon aluminum alloy) is used to purify (deoxidize) quality steels. Perfect addition to contribute fine grain, control of grain size, and uniform hardness with high aluminum efficiency.



CHROMIUM . . . .

We make all grades of ferro-chromium — .06%-2.00% carbon grades for stainless and carburizing steels; 4%-6% carbon grades for medium and high carbon steels; foundry grade for cast iron.



GRAINAL . . . . . .

(titanium-aluminum-zirconium) ladle or ingot addition to increase hardenability in fine-grained steels. Usually increases hardenability, toughness and resistance to impact simultaneously.

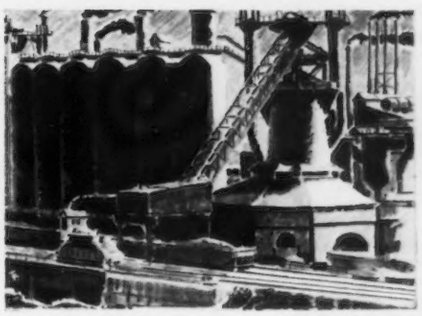
TOUGH ON THE AXIS

STEEL TOUGH...

IRON FOUNDRY ALLOYS.....

V-5 and V-7 Alloys reduce depth of chill and variation in chill depth, improve machinability.

Graphidox—a powerful graphitizing agent.



SILICON .....

We make all grades of ferro-silicon from 25% to 95%. 25% and 50% are primarily used to deoxidize steel; 75%-95% grades for electrical properties, corrosion resistance and for springs.

TITANIUM.....

We make all grades of titanium; high and medium carbon grades for deoxidizing and cleansing steels; low carbon grades for stabilizing carbides in high-chromium stainless steels.

VANADIUM

CORPORATION OF AMERICA · NEW YORK, N. Y. FERRO-ALLOYS

Three-way Plan

TO HELP YOU WITH WAR WORK

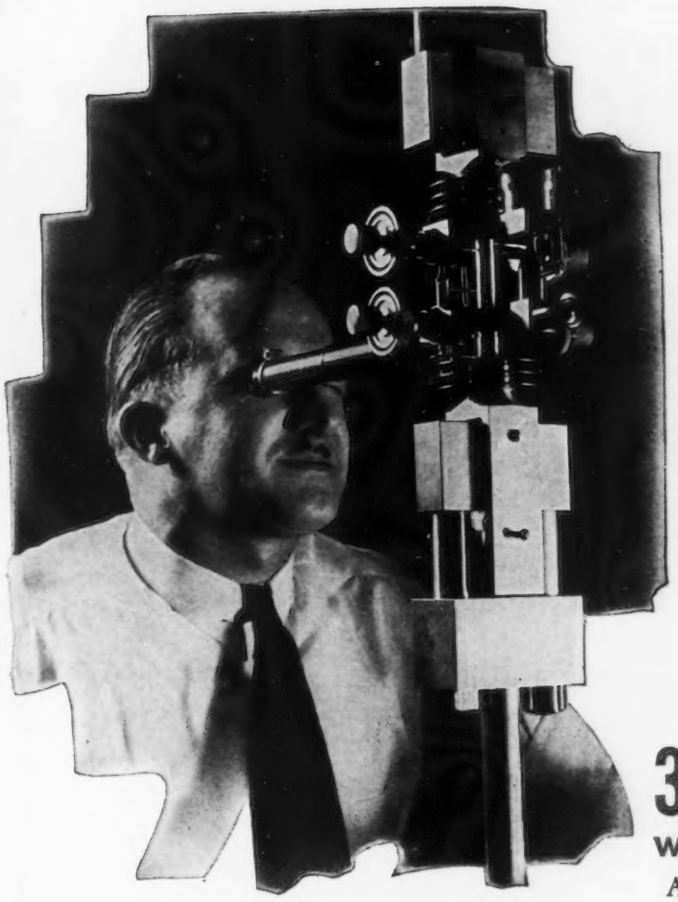
1. A SPECIAL ENGINEERING SERVICE

Our metallurgists and engineers are prepared and equipped to cooperate with you in finding the correct solution for special metal problems. Their practical experience in the metal industry enables them to effect many production short-cuts by determining the one best metal for a specific application. In fact, the "custom-made" alloy you need may be one regularly produced by us.

To those metal working plants engaged in the manufacture of a new product, perhaps by unfamiliar procedures, we can provide helpful suggestions for working copper, brass, bronze and the high strength copper-base metals such as the copper-silicon alloys. This assistance is three-fold.

ANACONDA

Anaconda Copper & Copper Alloys



2. A LABORATORY YOU CAN CALL YOUR OWN

The Technical Department of The American Brass Company has acquired an invaluable back-log of metallurgical experience based principally on the fact that physical properties of copper alloys can be varied by controlled adjustment of composition and methods of fabrication. This technical information representing more than a century of experience and the laboratories responsible for it, are at your service in fitting the metal to the need.

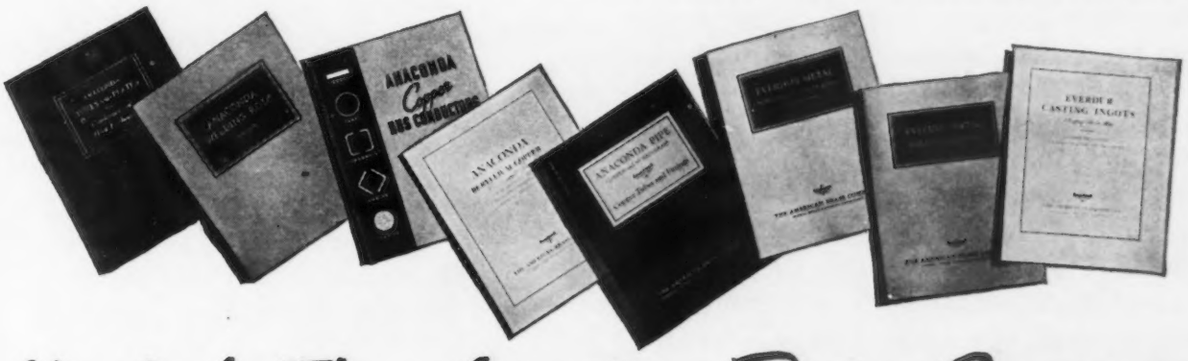
3. TECHNICAL INFORMATION WRITTEN BY ENGINEERS

Also available to you without cost is a list of publications on copper and copper-alloys that are literally packed with useful technical information which your engineers will find extremely helpful: applications, compositions, physical constants and physical properties; fabricating procedures, including oxy-acetylene and electric welding of copper and copper-alloys. This and other important data is combined in many Anaconda publications. Send for a list. 42104

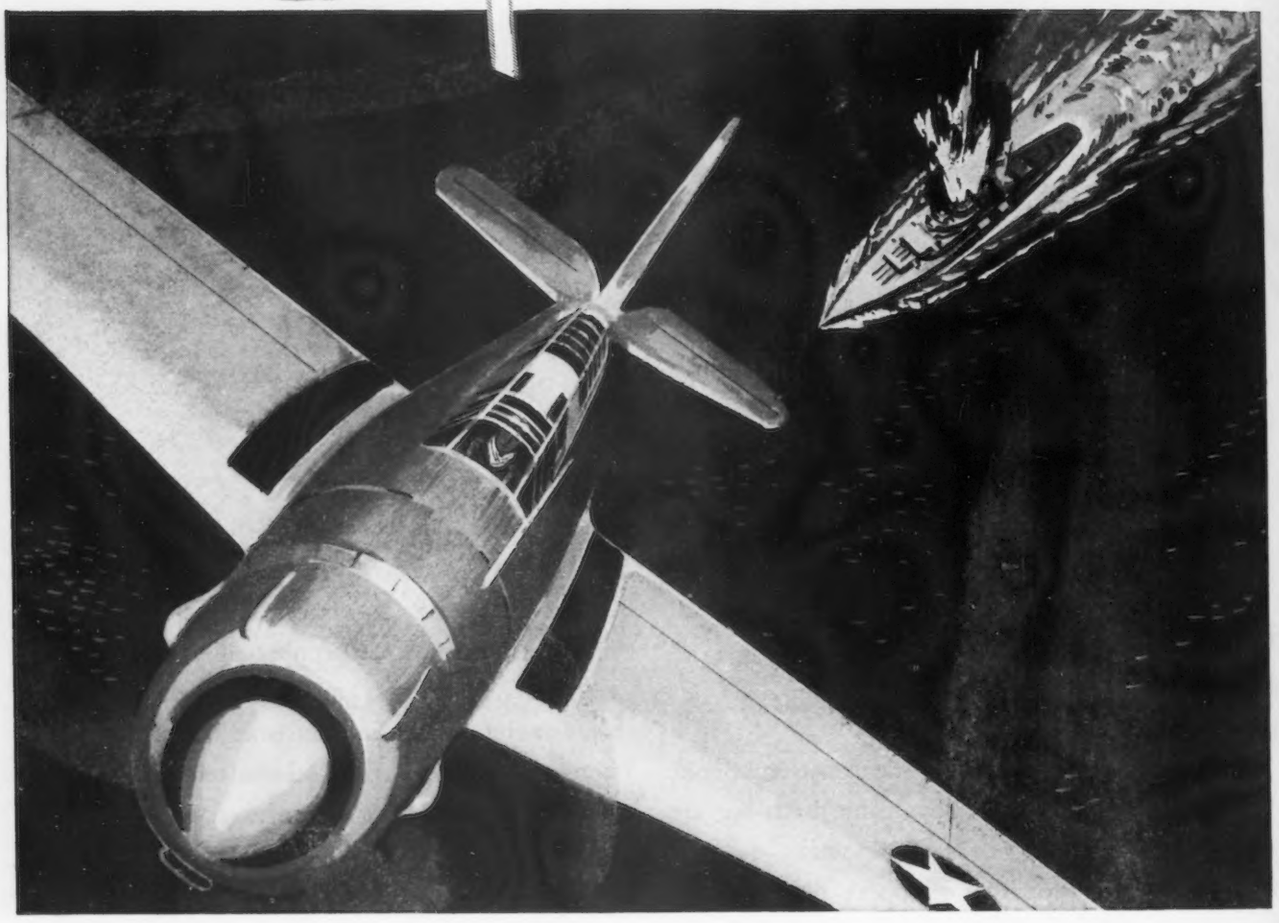
THE AMERICAN BRASS COMPANY

General Offices: Waterbury, Connecticut

Subsidiary of Anaconda Copper Mining Company

In Canada: Anaconda American Brass Ltd., New Toronto, Ont.

Made by The American Brass Company

Steel from Weirton's roaring mills



. . . to the hull of an Axis raider

Today, the mills of Weirton are roaring at top speed to produce steel—and more steel—for Victory. Steel for aerial bombs, shells, guns, gun mounts and the hundreds of other weapons of war must be of uniform quality to insure accuracy.

Weirton's "double control" by men and machines is geared in war, as in peace, to meet the most exacting requirements in steel-making. And there will be no let-up by the Weirton corps of workmen in the Battle of Production until ultimate victory is ours.

WEIRTON STEEL COMPANY

Weirton, West Virginia

Sales Offices in Principal Cities

Division of

NATIONAL STEEL CORPORATION

Executive Offices · Pittsburgh, Pa.

WHERE SEND OUR STEEL GETS ACTION!

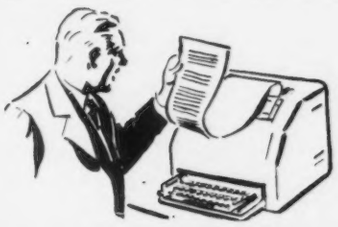
Office and Warehouse ★ Sales Office ●

A. MILNE & CO. IS MOBILIZED TO SAVE YOU TIME

Supplying the right tool steel, and supplying it fast, takes more than good intentions. It takes resourcefulness, "know how", foresight, and *organization.* Because A. Milne & Co. has them all, in full measure, plus experience gained in previous emergencies, orders can often be handled with a speed that surprises customers.

CRITICAL STEELS IN STOCK

We have made special efforts to maintain large stocks of 1.05/1.15% Carbon Steel, the most generally used grade, and also to maintain good stocks of the standard Manganese-Chrome-Tungsten type of Oil Hardening Steel. Timken Graphitic Steels, and Hollow and Solid Mining Drill Steels are among the other important steels also available from stock.



ALL U. S. OFFICES CONNECTED BY TELETYPE

All A. Milne & Co. offices, warehouses, and branches are connected by Teletype with each other and with producing mills. This modern system of instant communication saves many hours in tracking down a supply of the steel you need, or a suitable substitute.

WASHINGTON OFFICE IS INFORMATION CENTER

Customers who go to the Capitol on business find the Washington office a convenient information center. From this point, the entire A. Milne & Co. organization is kept informed of the latest Federal regulations and their proper interpretation.

KOLORKOTE IDENTIFICATION PREVENTS WASTE — HEAT TREATING INSTRUCTIONS WITH STEEL PREVENTS ERRORS

Different grades of Milne Tool Steel are identified by bright lacquer colors covering the entire surface. New workmen learn quickly to tell them apart. This feature saves training time, saves storage space, saves steel. Complete heat treating instructions are enclosed in the RED ENVELOPE attached to each shipment. The heat treater always knows what steel he is working by the color, and costly errors are avoided.

Send your next inquiry for Tool Steels, Mining Drill Steels, or Special Purpose Steels to —

A. MILNE & CO.

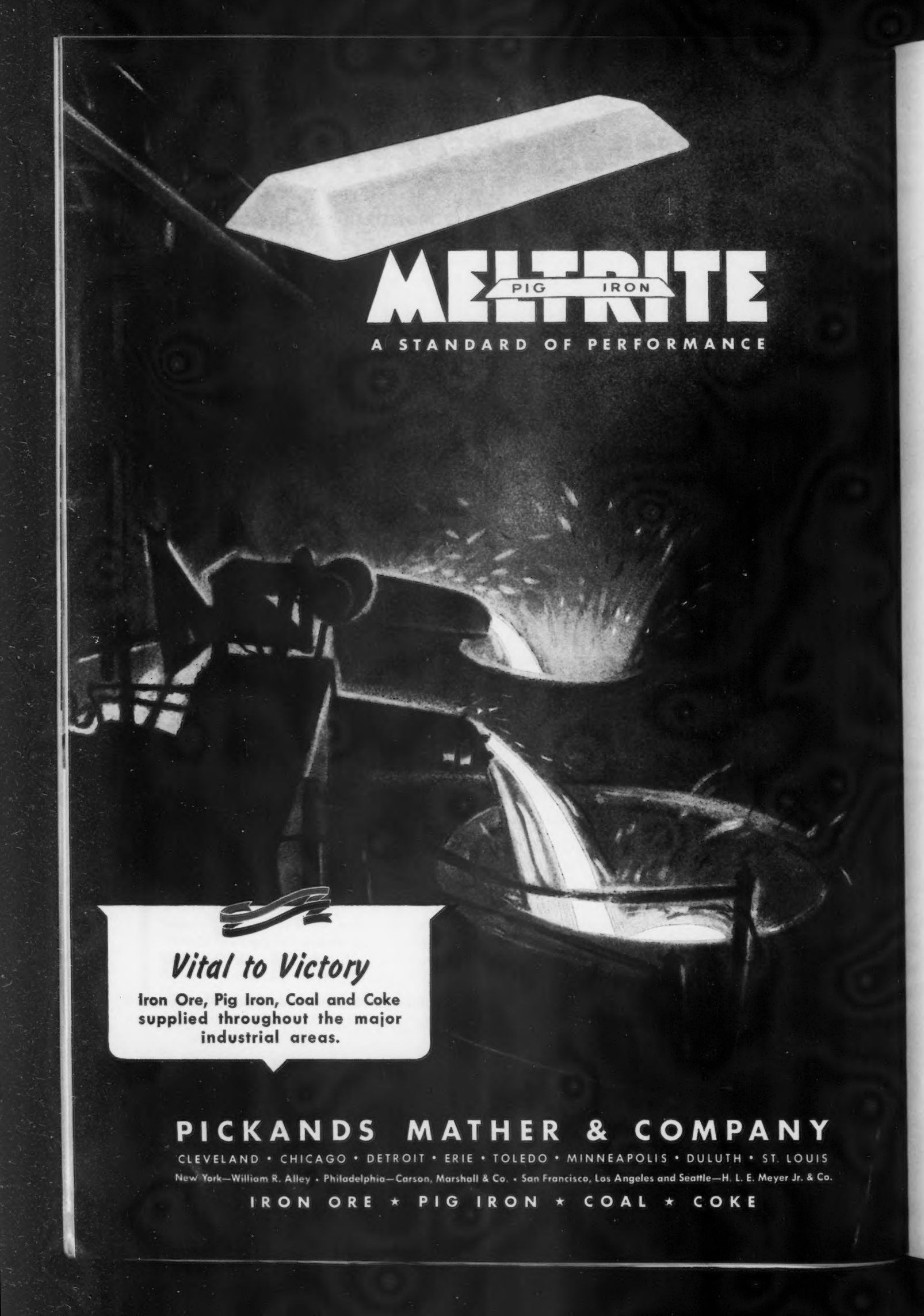
Offices and Warehouses

BOSTON 109 Broad St.
NEW YORK 741 Washington St.
CHICAGO 17 N. May St.

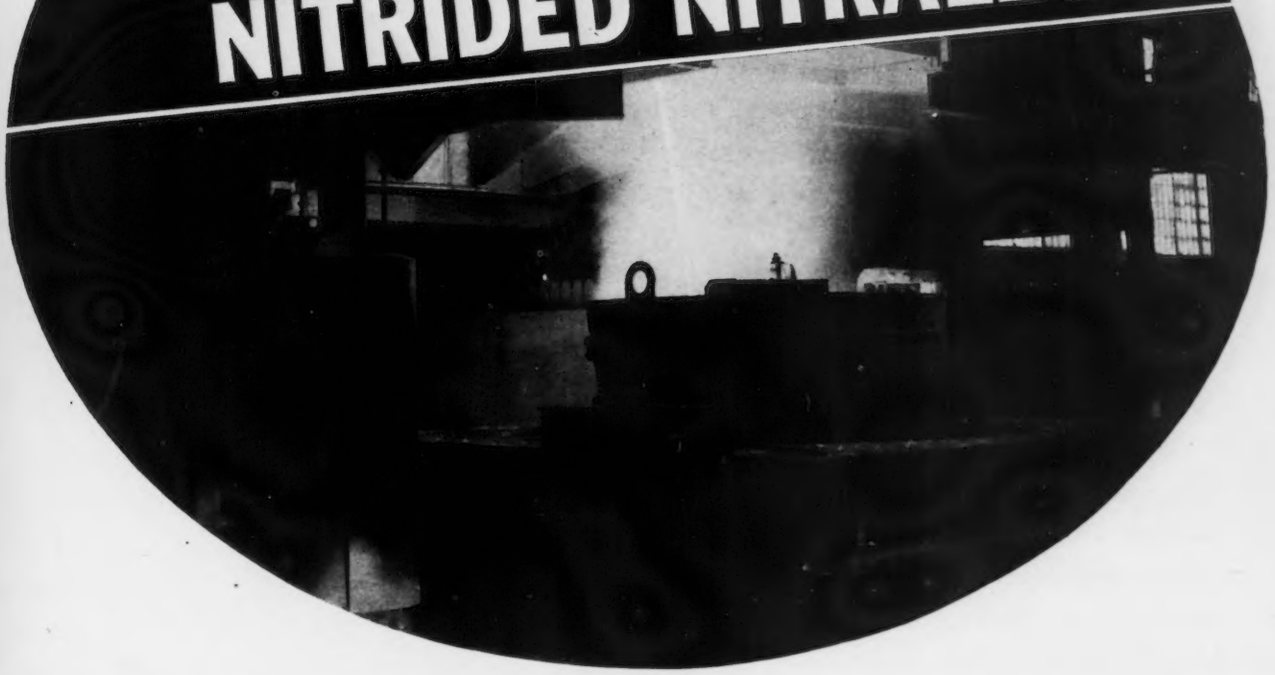
Sales Offices

PHILADELPHIA Bourse Bldg.
PITTSBURGH 604 Frick Bldg.
WASHINGTON, D. C. 635 F. Street, N.W.
DULUTH 2022 Woodland Ave.

Cable Address: Cardtable, New York


MELTRITE
PIG IRON
A STANDARD OF PERFORMANCE
Vital to Victory
Iron Ore, Pig Iron, Coal and Coke supplied throughout the major industrial areas.
PICKANDS MATHER & COMPANY
CLEVELAND • CHICAGO • DETROIT • ERIE • TOLEDO • MINNEAPOLIS • DULUTH • ST. LOUIS
New York—William R. Alley • Philadelphia—Carson, Marshall & Co. • San Francisco, Los Angeles and Seattle—H. L. E. Meyer Jr. & Co.
IRON ORE ★ PIG IRON ★ COAL ★ COKE

No substitute or alternative can duplicate NITRIDED NITRALLOY



THERE ARE many applications for which alloys and heat treatments other than Nitrided Nitralloy will meet the technical and economic requirements, but—

where economics and policy require the utmost in surface hardness, core properties, resistance to abrasion and fatigue,

there is no substitute for Nitralloy Steel in the sense that such substitute will give equivalent service. The Nitrided case obtained on standard Nitralloy Steels has properties that cannot be produced in any other way.

• • •

EXCLUSIVE PROPERTIES OF NITRIDED NITRALLOY

1. Extreme surface hardness (Vickers Diamond Brinell 900-1200).

2. Procurement of high hardness with a minimum of distortion.

3. Retention of hardness and abrasion resistance at high temperature (750° F.).

4. Resistance to softening by heating to as high a temperature as 1200° F.

5. Resistance to corrosion by weather.

6. Unequalled abrasive resistance in wear against itself or other material, including grit, sand, mud, etc., under certain conditions, in the absence of lubrication.

7. Availability! Nitralloy Steel is manufactured by many steel companies. They are listed on this page.

Only NITRALLOY will do what NITRALLOY does.

For booklets *containing complete technical details, write us or any licensee.*

THE NITRALLOY CORPORATION

230 PARK AVENUE — **NEW YORK, N. Y.**

Companies Licensed by The Nitralloy Corporation

ALLEGHENY LUDLUM STEEL CORP. ..... WATERVLIET, N. Y.
BETHLEHEM STEEL CO. ..... BETHLEHEM, PA.
COPPERWELD STEEL CO. ..... WARREN, O.
CRUCIBLE STEEL CO. OF AMERICA, NEW YORK, N.Y.
FIRTH-STERLING STEEL CO. ..... McKEESPORT, PA.
REPUBLIC STEEL CORPORATION ... CLEVELAND, O
THE TIMKEN ROLLER BEARING CO. ... CANTON, O
ROTARY ELECTRIC STEEL CO. ..... DETROIT, MICH.
VANADIUM-ALLOYS STEEL CO. .... PITTSBURGH, PA
ATLAS STEEL LIMITED ..... WELLAND, ONTARIO

Operating and Accredited Nitriding Agents

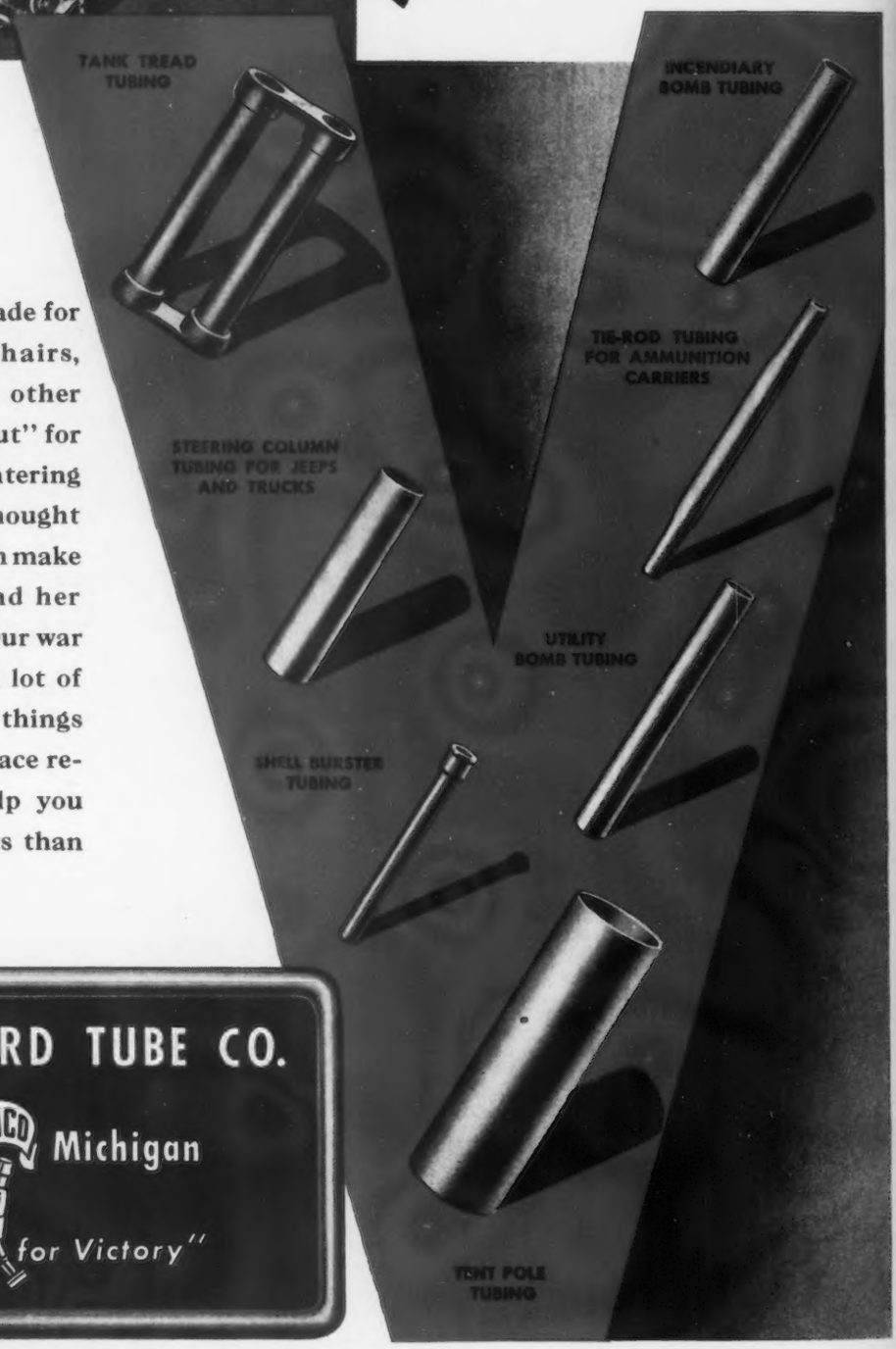
CAMDEN FORGE CO. ..... CAMDEN, N. J.
COMMERCIAL STEEL TREATING CORP. ..... DETROIT, MICH.
THE LAKESIDE STEEL IMPROVEMENT CO. ..... CLEVELAND, O.
LINDBERG STEEL TREATING CO. ..... CHICAGO, ILL.
LINK-BELT CO. ..... PHILADELPHIA, PA.
MET-LAB, INC. ..... PHILADELPHIA, PA.
NEW ENGLAND METALLURGICAL CORP. ..... BOSTON, MASS.
PITTSBURGH COMMERCIAL HEAT TREATING CO. ..... PITTSBURGH, PA.
QUEEN CITY STEEL TREATING CO., CINCINNATI, O.
WESLEY STEEL TREATING CO. ... MILWAUKEE, WIS.
ONTARIO RESEARCH FOUNDATION ... TORONTO, ONTARIO, CANADA

Manufacturers of Nitralloy Steel Castings

LEBANON STEEL FOUNDRY ..... LEBANON, PA.
EMPIRE STEEL CASTINGS CO. ..... READING, PA.
THE MASSILLON STEEL CASTING CO. ..... MASSILLON, O.
MILWAUKEE STEEL FOUNDRY DIV., GREDE FOUNDRIES, INC. ..... MILWAUKEE, WIS.
WARMAN STEEL CASTING CO., LOS ANGELES, CAL.

3011

we're making these for *Victory*



THE tubing we made for automobiles, tables, chairs, vacuum sweepers and other peacetime products is "out" for the duration. We're centering all our facilities—all our thought and effort on things we can make to help our Country and her Allies win total victory. Our war experience is giving us a lot of new ideas on how to do things better. We hope when peace returns to be able to help you make even finer products than you have in the past.

THE STANDARD TUBE CO.

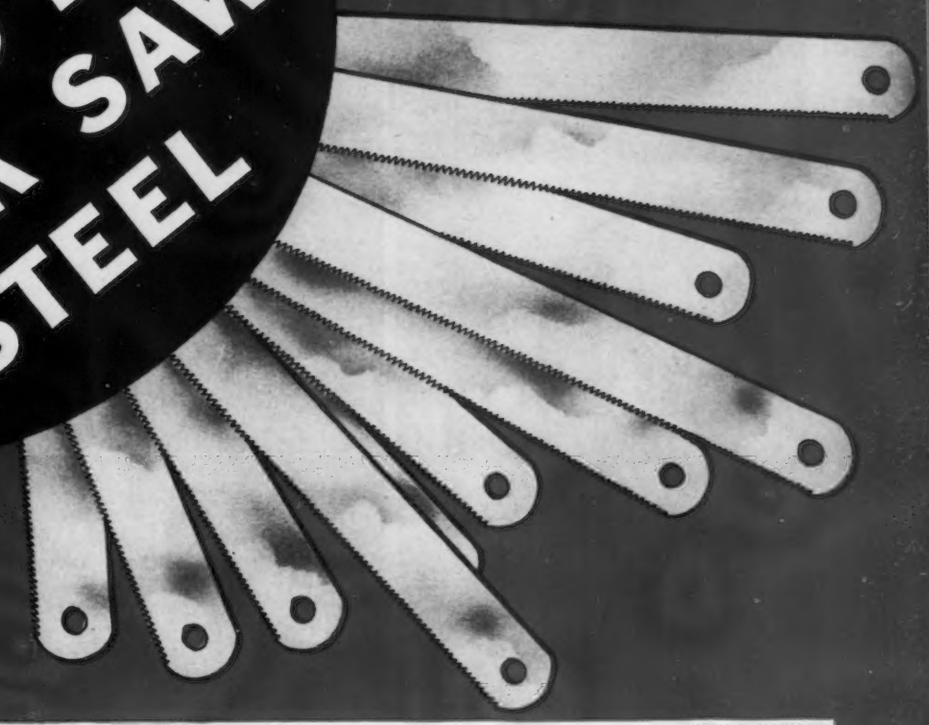
Detroit STANCO Michigan

"All Out for Victory"

A New Steel *Perfected*—

Just when You Need it Most!

INGERSOLL D-B-L* HACK SAW STEEL



* Produced under exclusive license arrangement with Allegheny-Ludlum Steel Corporation

Other Special INGERSOLL Sheet Steels include:

Alloy Steels
Armor Plate
Clutch Plate Steels
Tillage Steels
Soft Center Steels
Shovel Steels
Knife Steels
TEM-CROSS Steel
IngAclad (Stainless-Clad Steel)
Stainless Steels and Saw Steels, including "18-4-1" and Molybdenum and D-B-L Hack Saw Steels.

Faced with the biggest job it has ever known, American Industry welcomes the timely development of Ingersoll D-B-L.

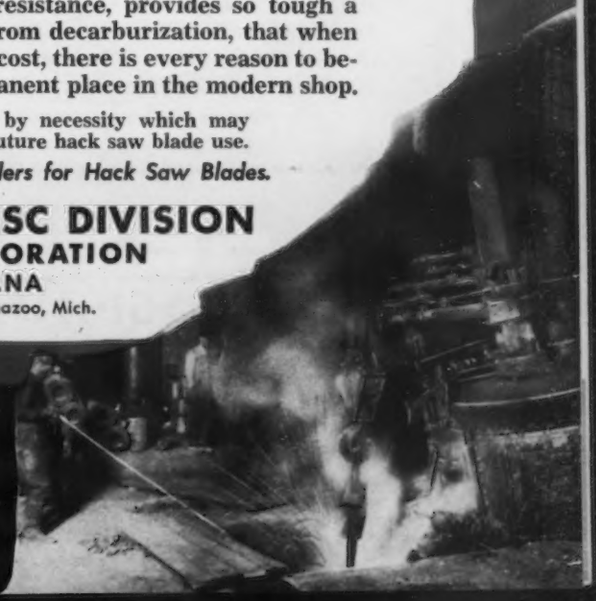
With 18-4-1 restricted by the shortage of vital alloys, the problem of supplying hack saw blades that would meet every shop need became a serious one.

Ingersoll D-B-L is so high in impact resistance, provides so tough a cutting edge, and is relatively so free from decarburization, that when these advantages are added to its lower cost, there is every reason to believe Ingersoll D-B-L has found a permanent place in the modern shop.

Here is one substitute developed by necessity which may well become the prime metal for future hack saw blade use.

Specify Ingersoll D-B-L Steel on orders for Hack Saw Blades.

INGERSOLL STEEL & DISC DIVISION
BORG-WARNER CORPORATION
NEW CASTLE, INDIANA
Plants: New Castle, Ind.; Chicago, Ill.; Kalamazoo, Mich.



INGERSOLL

SPECIAL STEELS for SPECIAL USES

READY REFERENCE DATA

FOR YOUR HELP IN FABRICATING SEYMOUR PHOSPHOR BRONZE--

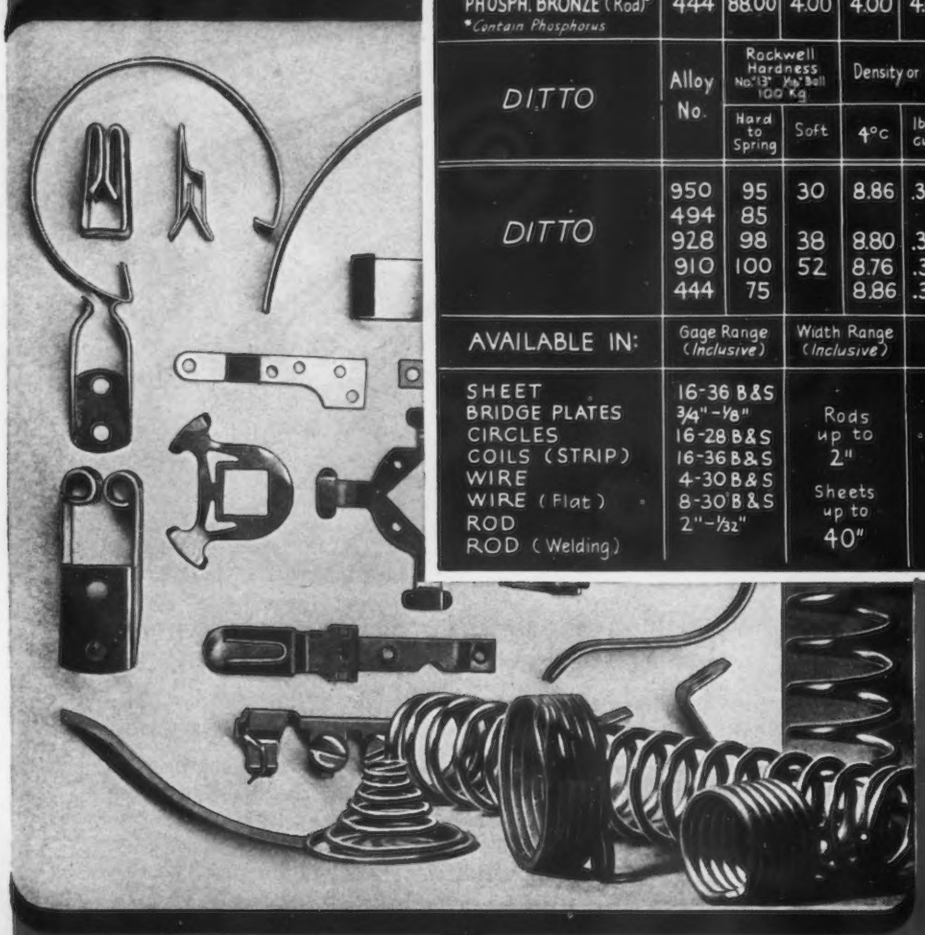
SEYMOUR PHOSPHOR BRONZE

ALLOY	Alloy No.	COMPOSITION Approximate Percent				Tensile Strength lbs. per sq. in.		Elongation Percent in 2 in. min.	
		Copper	Zinc	Tin	Lead	Hard to Spring	Soft	Hard to Spring	Soft
GRADE A (Sheet)*	950	95.00		5.00		105,000	45,000	1.5	50
" B (Rod)*	494	94.00		5.00	1.00	61,000	50,000		40
" C (Sheet)*	928	92.00		8.00		112,000	55,000	3	
" D (")*	910	90.00		10.00		115,000	60,000	5	65
PHOSPH. BRONZE (Rod)*	444	88.00	4.00	4.00	4.00	*60,000 (*Small Size Only)		20	

*Contain Phosphorus

DITTO	Alloy No.	Rockwell Hardness No. 13 1/16" Ball 100 Kg		Density or Spec. Grav.			Melting Point °F	Elec. Resistance	Elec. Conductivity % I. A.C.S 20°C	
		Hard to Spring	Soft	4°C	lbs. per cu. in.	lbs. per cu. ft.				
DITTO	950	95	30	8.86	.320	552	1920	6.1	16.5	
	494	85						6.0	16.8	
	928	98	38	8.80	.318	549		7.8	12.8	
	910	100	52	8.76	.316	546		9.4	10.6	
	444	75		8.86	.320	552	1830	8.2	12.2	

AVAILABLE IN:	Gage Range (Inclusive)	Width Range (Inclusive)	MISCELLANEOUS
SHEET	16-36 B&S	Rods up to 2"	*WIRE AND ROD* supplied Round, Half-Round, Quarter-Round, Oval, Half-Oval, Hexagon, Octagon, Square, Triangular or Fancy-tinned or bare.
BRIDGE PLATES	3/4" - 1/8"		
CIRCLES	16-28 B&S		
COILS (STRIP)	16-36 B&S		
WIRE	4-30 B&S		
WIRE (Flat)	8-30 B&S		
ROD	2" - 1/32"	Sheets up to 40"	*SHEET AND STRIP* in roll finish or Patent Level. Strip tinned if desired.
ROD (Welding)			

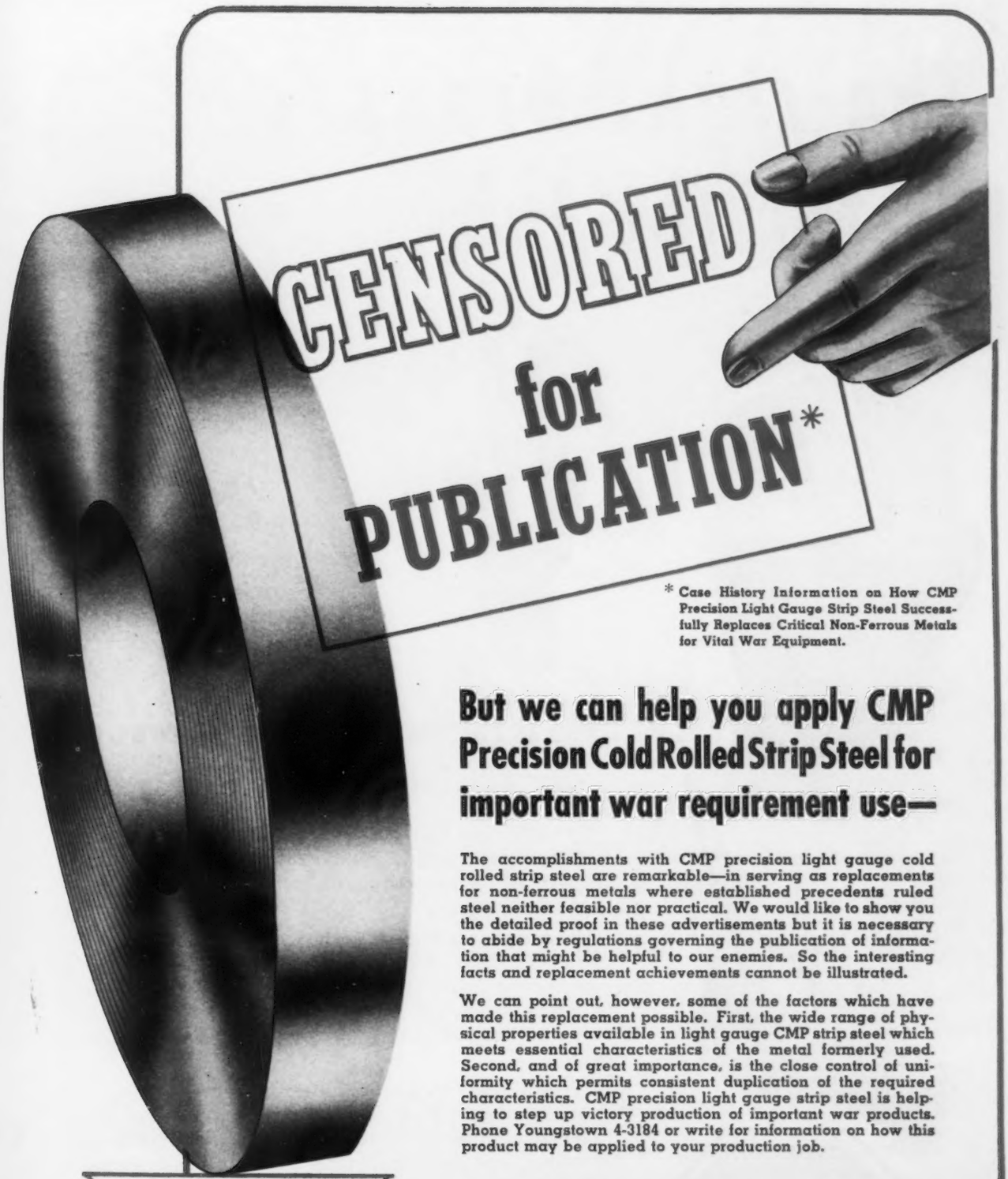


THE SEYMOUR MFG. CO.
SEYMOUR, CONN.

•

NON-FERROUS ALLOYS SINCE 1878

SEYMOUR
PHOSPHOR BRONZE



* Case History Information on How CMP Precision Light Gauge Strip Steel Successfully Replaces Critical Non-Ferrous Metals for Vital War Equipment.

But we can help you apply CMP Precision Cold Rolled Strip Steel for important war requirement use—

The accomplishments with CMP precision light gauge cold rolled strip steel are remarkable—in serving as replacements for non-ferrous metals where established precedents ruled steel neither feasible nor practical. We would like to show you the detailed proof in these advertisements but it is necessary to abide by regulations governing the publication of information that might be helpful to our enemies. So the interesting facts and replacement achievements cannot be illustrated.

We can point out, however, some of the factors which have made this replacement possible. First, the wide range of physical properties available in light gauge CMP strip steel which meets essential characteristics of the metal formerly used. Second, and of great importance, is the close control of uniformity which permits consistent duplication of the required characteristics. CMP precision light gauge strip steel is helping to step up victory production of important war products. Phone Youngstown 4-3184 or write for information on how this product may be applied to your production job.

LET'S ALL HELP TODAY

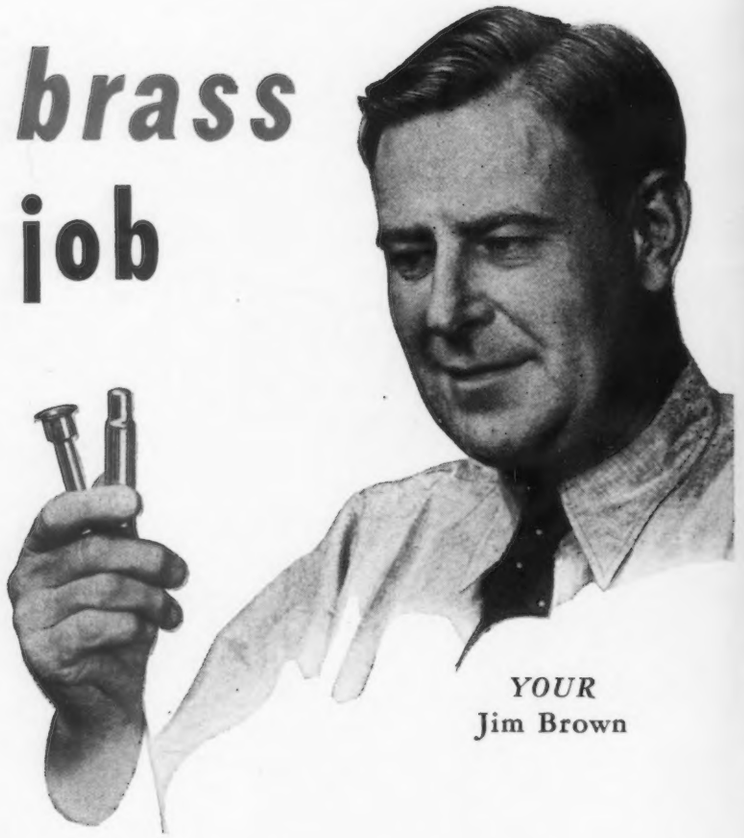
Get in the Scrap!

CMP PRECISION COLD ROLLED STRIP STEEL

THE COLD METAL PRODUCTS CO.

Subsidiary of The Cold Metal Process Co., Youngstown, O.

The *right brass* for the job



YOUR
Jim Brown

OUR
Bill Smith

The problems of *your* Jim Browns and *our* Bill Smiths may be the same

YOUR men and ours are putting their all into the battle for greater production. Their knowledge of brass and its war requirements is helping to win the fight for freedom.

Perhaps your problems and ours are fundamentally the same. If yours involve deep draws in brass, special degrees of softness or hardness, or extremely close tolerances, we will gladly give you the benefit of our long experience in specifying the right brass for your job.

Western-operated ammunition plants are making millions of deep drawn parts *daily* out of Western brass. The metal in each cartridge case must possess the right ductility, and the correct tensile strength to draw without rupture.

We invite consultation on your brass requirements for present and post-war products.

Western
BRASS
PRODUCTS
WESTERN CARTRIDGE COMPANY
EAST ALTON, ILLINOIS, U. S. A.

BRASS MILL DIVISION
Western Cartridge Company
East Alton, Illinois

BRASS • BRONZE • PHOSPHOR BRONZE • NICKEL SILVER

TITAN
LOOKS AHEAD

● The Titan Metal Manufacturing Company started production in the first World War.

Today we again take pride in serving our Country in time of trial and danger, looking ahead with courage; courage based not on blind optimism, but rather on a full recognition of the tremendous task ahead, coupled with quiet determination.

At Titan we are working the clock around, producing at maximum capacity, enlarging our facilities, conducting continuous metallurgical research,— in short, taking every step possible to produce maximum quantities with concurrent maximum quality.

RASS AND BRONZE RODS
FORGINGS
DIE CASTINGS
WELDING RODS

TITAN
METAL MANUFACTURING CO.
BELLEFONTE, PA.
A Great Name in Bronze Since 1915

Visit Space D-111 at National Metal Congress

National need bears heavily now on one material, now on another, for the uses of wartime industry. In the *National Emergency Steels* that have lately been developed, Molybdenum plays an important part. As to the availability and usefulness of Molybdenum, Tungsten, and Boron, correspondence is invited by the Molybdenum Corporation of America. Printed matter is offered.

AMERICAN Production, American Distribution, American Control—Completely Integrated.
Offices: Pittsburgh, New York, Chicago, Detroit, Los Angeles, San Francisco, Seattle.
Sales Representatives: Edgar L. Fink, Detroit; H. C. Donaldson & Co., Los Angeles, San Francisco, Seattle.

MOLYBDENUM
CORPORATION OF AMERICA
GRANT BUILDING, PITTSBURGH, PA.

MCA

Control...

THE CRITICAL FACTOR IN ANTI-AIRCRAFT GUN OR STEEL CASTING

BATTERIES of modern anti-aircraft plaster a wide radius with their "flak" . . . fire with machine gun rapidity. But neither range nor rate of fire will be effective unless control instruments are accurate.

The same careful control that governs the *operation* of military equipment must be exercised in its *construction.* That is why the photograph above illustrates a step just as important in warfare as accurate anti-aircraft fire. For it shows *controlled* pouring as practiced at the Lebanon Steel Foundry . . . fabricators of equipment for the nation's armed forces and for industries vital to the war effort.

Control of Lebanon pouring . . . both lip and bottom . . . begins *before* the ladles are tipped. Thoroughly trained men check every mold for cleanliness. The pouring temperature is carefully regulated to the type of casting . . . whether thin-sectioned or heavy. Optical pyrometer readings are taken. Speed of pouring is controlled with regard for size and contours. Pouring personnel is selected for alertness.

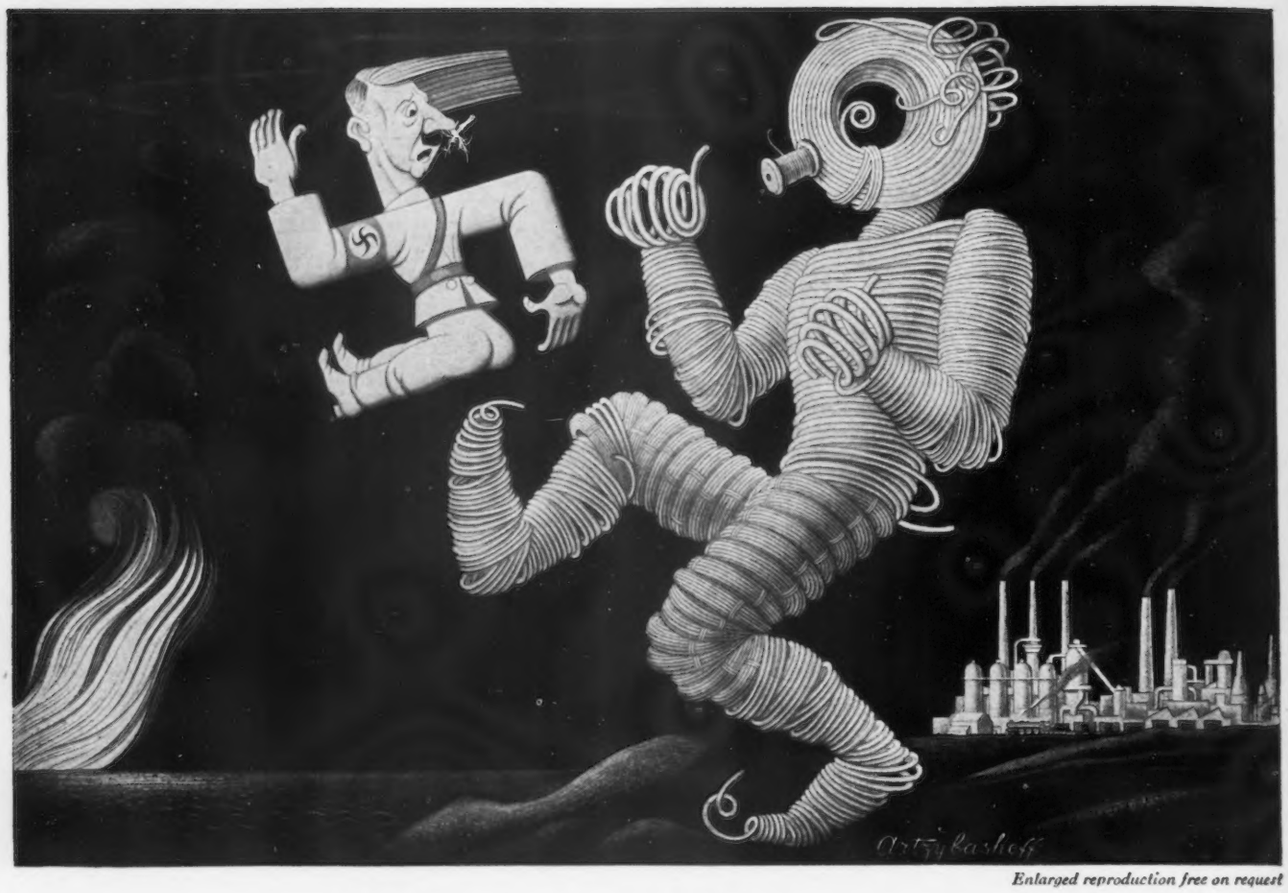
To obtain the outstanding integrity and soundness of Circle Ⓛ Castings, Lebanon pays the premium of control without skimping . . . control day in and day out. That's why Circle Ⓛ Castings measure up to the severest demands of both battlefront and home front. That's why they are the logical choice of such industrial leaders as American Car and Foundry and Baldwin Locomotive.

Lebanon metallurgists have had close contact with war production requirements since the beginning. Their experience in solving today's type of industrial problems is available to interested organizations.

LEBANON STEEL FOUNDRY · LEBANON, PENNA.

ORIGINAL AMERICAN LICENSEE GEORGE FISCHER (SWISS CHAMOTTE) METHOD

LEBANON *Stainless and Special Alloy* **STEEL CASTINGS**



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Wire with Kick in it

Wissco wire is putting temper, spring action, and strength into the attack.

It is fighting in everything from airplanes, to bombs, to torpedoes, to tanks, to uniforms, to warships . . . and then some.

In every foot of Wissco Wire is the fighting spirit of thousands of loyal production soldiers whose output for Victory is breaking all-time records. In every inch is the skill acquired in 121 years of research, discovery and pioneering—the things it took to make Wissco one of the world's leading wire producers.

If you have a war need for wire, put it up to experts. Wickwire Spencer Steel Company, 500 Fifth Avenue, New York; Buffalo, Chicago, Detroit, Philadelphia, San Francisco, Worcester.

EVERYTHING IN WIRE. High and Low Carbon Wire—Wire for Springs, for Wire Rope, for use in scores of industries, in a variety of sizes, tempers, grades and finishes.

CURIOSITY INC. Wissco research has produced many basic improvements in wire metallurgy, and in wire uniformity and quality. Every step from ore pile to blast furnace, to open hearth, to finished wire is done right in our own mills.

SEND YOUR WIRE QUESTIONS TO WICKWIRE SPENCER

WISSCO WIRE

BY WICKWIRE SPENCER

WISSCO PRODUCTS

Let a Meehanite Foundry Solve Your Casting Problems

Ansonia, Conn.
Farrel-Birmingham Co., Inc.

Bridgewater, Mass.
The Henry Perkins Co.

Buffalo, N. Y.
Pohlman Foundry Co., Inc.

Charleston, W. Va.
Kanawha Manufacturing Co.

Chattanooga, Tenn.
Ross-Meehan Foundries

Chicago, Ill.
Greenlee Foundry Company

Cincinnati, Ohio
Cincinnati Grinders Incorporated

Cincinnati, Ohio
The Cincinnati Milling Machine Co.

Cleveland, Ohio
Fulton Foundry & Machine Co.

Denver, Colo.
The Stearns-Roger Mfg. Co.

Detroit, Mich.
Atlas Foundry Co.

Flint, Mich.
General Foundry & Mfg. Company

Hamilton, Ohio
The Hamilton Foundry & Machine Co.

Irvington, N. J.
Barnett Foundry & Machine Co.

Los Angeles, Calif.
Kinney Iron Works

Milwaukee, Wis.
Koehring Company

Mt. Vernon, O., Grove City, Pa.
Cooper-Bessemer Corporation

New York, N. Y.
The American Brake Shoe & Foundry Co.

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Philadelphia, Pa.
Florence Pipe Foundry & Machine Co., (R. D. Wood Company, Selling Agents)

Phillipsburg, N. J.
Warren Foundry & Pipe Corp.

Pittsburgh, Pa.
Meehanite Metal Corporation

Pittsburgh, Pa.
Rosedale Foundry & Machine Co.

Rochester, N. Y.
American Laundry Machinery Co.

St. Louis, Mo.
Banner Iron Works

St. Paul, Minn.
Valley Iron Works

London, Eng.
The International Meehanite Metal Co., Ltd.

Waterloo, N. S. W.
Australian Meehanite Metal Co., Ltd.

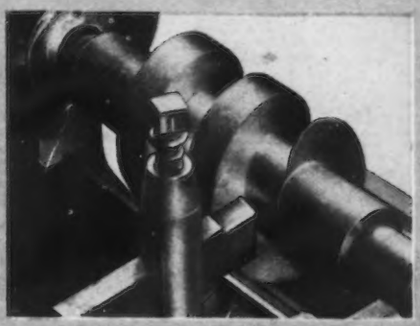
Johannesburg, South Africa
Meehanite Metal Co. (S.A.) (Pty.) Ltd.

Meehanite GOES TO SEA!

Vital Material Problem *Solved by Meehanite*

Aboard many Navy and Merchant Marine vessels today, the vital job of handling fuel and lubricating oil is entrusted to Quimby Pumps. And for the heart of the pump —the screws—Meehanite Metal was chosen because it combines the special qualities needed where long life and dependability are "musts."

Manufacturers everywhere are finding in one or more of the twenty-one types of Meehanite, the exact qualities they seek in a cast metal. "Bridging the Gap" between cast iron and steel, Meehanite provides in its various types such properties as high strength; resistance to wear, corrosion, and heat; vibration damping; adaptability to heat-treatment and flame-hardening.



FREE-MACHINING

Machinability Rating Tests prove Meehanite more machinable than other materials having comparable physical properties—and companies striving for maximum production find this an important advantage. This is due to the constitution of the metal, which frequently permits substantially increased cutting speeds, and to the dimensional accuracy and smooth surfaces characteristic of Meehanite casting, which mean less metal need be removed in finishing.

The nearest Meehanite Foundry will gladly answer your questions regarding this modern cast metal, and help you pick a type to solve material problems for you.

MEEHANITE RESEARCH INSTITUTE · 311 Ross Street
Pittsburgh, Pa.

MEEHANITE

SEND FOR BOOKLET

Visit Booth B-320 at the Metal Show

O E M Photo by Palmer, in an Allegheny Ludlum plant

Save . . TO PRODUCE MORE

★ *The nation needs scrap iron and steel—millions of extra tons of it this year. Make your clean-up complete, both in the plant and at home. Subject every pound of idle metal to the searching question: "Is it absolutely essential that we keep this?"*

But don't stop there! Rounding up the scrap and instituting more thorough salvage methods are only part of the job of conserving the nation's resources. Start at the beginning and make better use of *new* steel . . . aim to get more finished products out of it, with less waste.

That is particularly necessary with electric-furnace steels, and the critical alloys they contain. There are many ways to save. Both stainless and tool steels can be more efficiently selected and better used, to step up production and cut down the amount of rejects and spoilage. The substitution of lower alloys, and of standard analyses, sizes or finishes instead of special ones, all offer good opportunities to save.

Right now, do your share to increase the nation's scrap stockpile. And for the duration, avoid waste in all its forms—*make every pound of steel and alloys go as far as possible.* There will be problems involved, but not insoluble ones. Call on our Technical Staff to help you

AL
STEEL FOR THE NATION'S WELFARE

Allegheny Ludlum
STEEL CORPORATION
GENERAL OFFICES: PITTSBURGH, PENNSYLVANIA

THE BROOKLYN BRIDGE, *completed in 1879,—the beams and channels of the superstructure were made at Midvale*

Visitors thronged the city at the opening. President Arthur and Governor Cleveland came. "Brooklyn," said the *Tribune*, "blossomed like a rose." Probably no other single event was more instrumental in making New York what it is today—first city of the world. An interesting thing about those Midvale beams and channels is that their rolling, direct from billets of rectangular cross section, was wholly new. Midvale's attitude then, as today, was that new problems demanded new approaches—safeguarded by seasoned experience.

1867 75TH ANNIVERSARY 1942

THE MIDVALE COMPANY • NICETOWN • PHILADELPHIA, PA.

OFFICES: New York • Chicago • Pittsburgh • Washington • Cleveland • San Francisco

MIDVALE

How to choose and use

WIRE ROPE SHEAVES

Practically every piece of wire rope on a "running" job operates over sheaves. By choosing sheaves which are exactly suited to the job, and then keeping those sheaves in good repair, the service life of the wire rope can be greatly lengthened. Here are some simple tips that have been tried and proved in service:

1. *Check groove diameter* — Make sure that the sheave groove is large enough so that it doesn't pinch the rope. The rope must seat freely down into the bottom of the groove. If it rides the sides of the groove, pinching and abrasion will result. Unequal strains will be set up. Much of the service life built into the rope will be lost.

For best results, observe the tolerances listed in the following table:

Nominal wire rope diameter	*Minimum groove tolerance*	*Maximum groove tolerance*
0 to 3/4"	+ 1/32"	+ 1/16"
13/16 to 1 1/8"	+ 3/64"	+ 3/32"
1 3/16 to 1 1/2"	+ 1/16"	+ 1/8"
1 9/16 to 2 1/4"	+ 3/32"	+ 3/16"
2 5/16" and larger	+ 1/8"	+ 1/4"

2. *Check sheave diameter* — The larger the sheave, the longer your wire rope will last. When a rope pulls sharply around a small-diameter sheave, it is subjected to severe bending and crushing. This tends to make the rope "go out of round," causes wear on outside wires, and stresses the various parts of the rope unequally.

It should be remembered that certain machines and equipment must of necessity be designed with smaller sheaves than indicated by best sheave practice. This does not indicate poor design, but means simply that, all factors considered, the disadvantages of smaller sheaves are outweighed by advantages in other features of the design.

But whenever there is a choice between a small sheave and larger one—*the larger diameter sheave should be used.*

3. *Keep grooves and flanges smooth* — After a sheave has been handling heavy loads for some time, the imprint of the rope lay is apt to be worn into the groove of the sheave. A wire rope, working over this sharp-edged imprint, is subject to abrasion and loss of operating efficiency.

If a new rope is put in service over such a sheave, its lay will not fit into the imprints and the "chewing" or "filing" action will be greatly increased. Even if a new rope is not installed, the old rope will be badly abraded as its lay lengthens and enlarges the depth and length of the imprint.

The best way to prevent sheave grooves from wearing prematurely is to select a sheave made of the proper material. Manganese steel sheaves (which are now difficult or impossible to get) are the best all-around sheaves available. Other alloy steels have also been used with success.

However, if you cannot get special sheave steel, the next best thing is to take care of the sheaves you do have. Inspect the sheave grooves frequently. If evidence of wear develops, smooth up the grooves immediately in accordance with groove tolerances which appear in the foregoing table. You will be more than repaid for the effort in longer sheave and rope service and in more efficient operation.

BETHLEHEM STEEL COMPANY

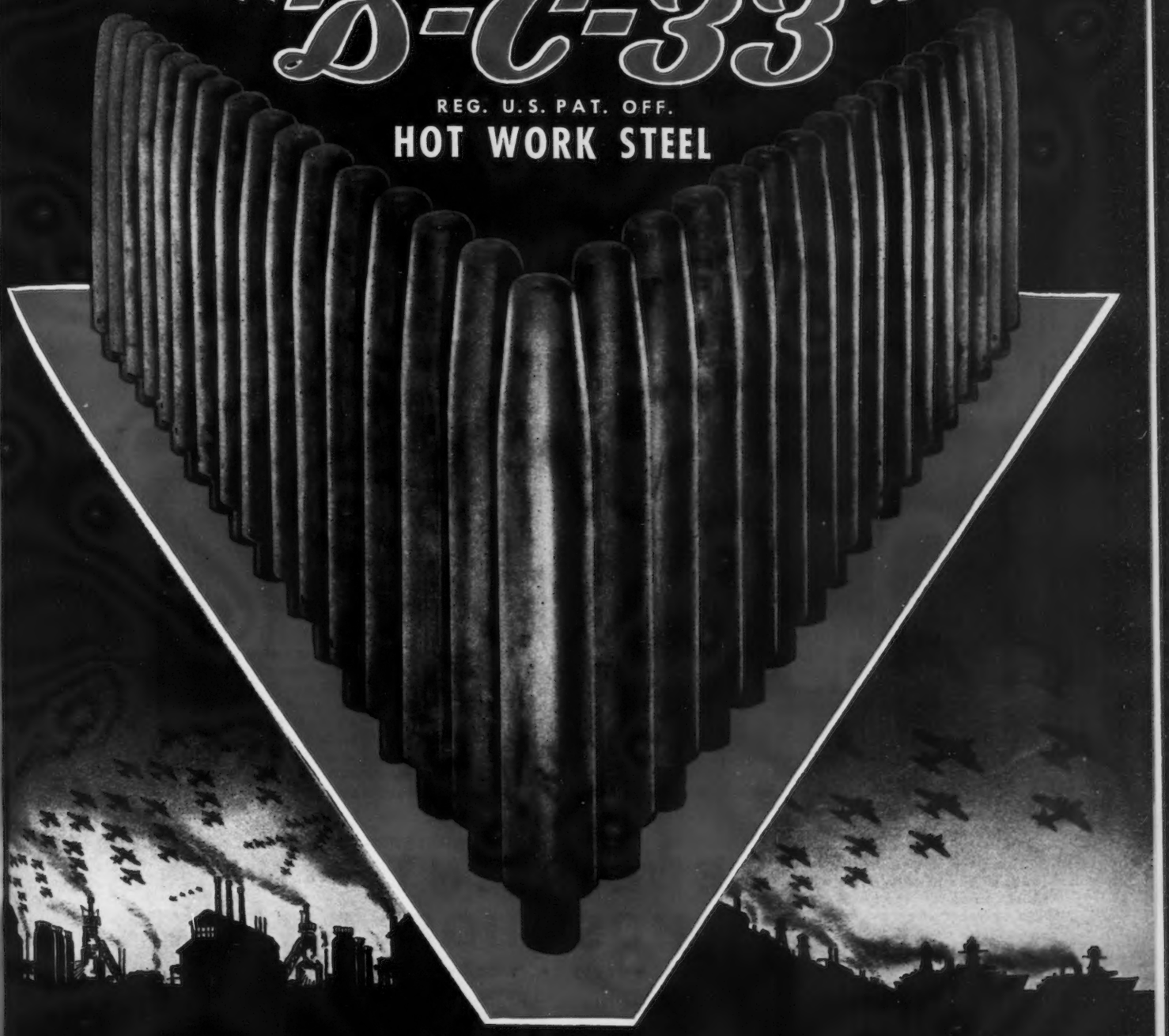
BETHLEHEM STEEL

KLOSTER'S "PURE ORE"

"D-C-33"

REG. U.S. PAT. OFF.

HOT WORK STEEL



KLOSTER STEEL CORPORATION

SOLE PRODUCERS OF "D-C-33" HOT WORK STEEL

224-228 NORTH JUSTINE ST. – CHICAGO, ILLINOIS

..."Steel to Endure Must be Pure"

First—catch your enemy

Modern warfare moves fast . . . depends upon instant transmission of information about the swift-shifting patterns of battle . . . to place the enemy . . . then blast him.

So, gone to war are all the familiar devices of communication—radio, wireless and telephone equipment—serving all our armed forces wherever they may be. And—whether exposed to the extremes of heat and cold of far flung battlefields, baked by desert suns, blasted by sand, wallowing in mud or snow, deluged with water, rocked by the concussions of high explosives—these sensitive communications devices must function faultlessly. Each part, and every material used must be able to withstand many times normal stress.

The natural supposition would be that the complete re-design of the equipment would have been necessary.

But, the amazing fact is that, in many specifications, our instruments of communication do not vary from their peacetime counterparts. So well did their makers build, long established standards for quality were fully equal to extraordinary wartime demands.

Thus it is that we are continuing to supply Elephant Brand Phosphor Bronze to manufacturers of such devices—and to a large number of manufacturers of other electric equipment, as well. The Elephant Brand properties they used in peacetime to give you extra dividends in long performance and low maintenance, now furnish reserves of endurance against the rigors of war. Still, this is the best material that can be used for the purposes.

ELEPHANT BRAND PHOSPHOR BRONZE

SHEETS • RODS • WIRE • ROPE • CASTINGS • BUSHINGS

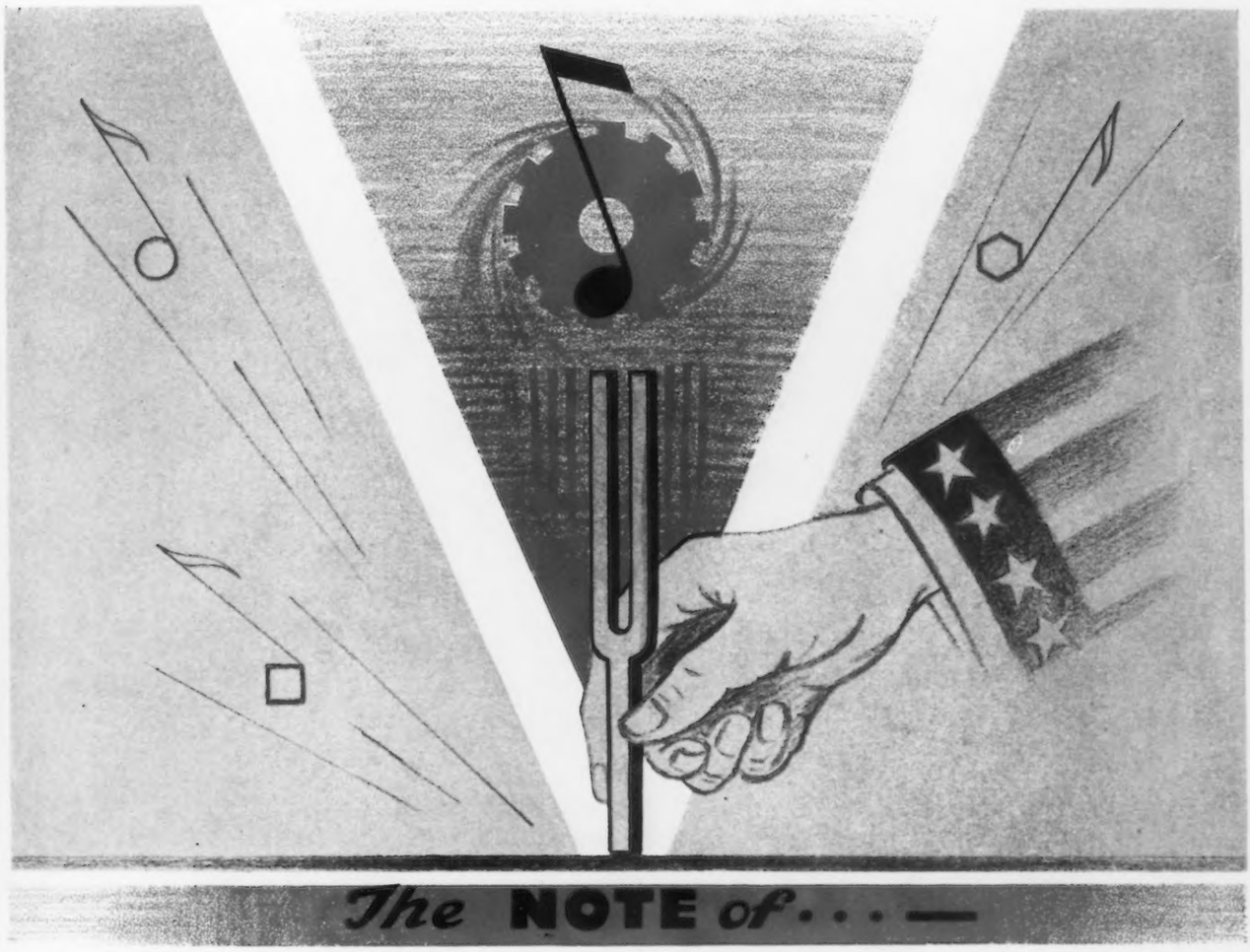
***HARD; VERY STRONG, YET RESILIENT; RESISTANT TO CORROSION, WEAR,** shock abrasion and fatigue; a perfect conductor; non-magnetic and resistant to breakdown under arcing—Elephant Brand Phosphor Bronze again will be a competitive advantage to many products in the days of peace to come.*

And, to help you determine its relation to your postwar plans, we have prepared an authoritative "Technical Data Book" that explains the characteristics and applications of the various alloys. If this would help you, it's yours for the asking. Or, for more specific advice, write our engineering department.

THE PHOSPHOR BRONZE SMELTING COMPANY

Original Manufacturers of Phosphor Bronze in the U.S.A. — Established 1874

2210 Washington Ave., Philadelphia, Pa.



The **NOTE** *of . . .* —

VICTORY

. . . is heard coming from the nation's war plants as America's industrial army sets a faster pace in full-time production.

The steady hum of machines fabricating vital parts for arms and munitions . . . the ring of riveters on steel for building ships and subs . . . the quickened tempo of assembly lines for producing super-tanks and bombers . . . all are tuned to a single purpose: work to win.

In this harmony of effort Bliss & Laughlin, Inc., is cooperating with its products and services. B & L Cold Finished Steels are adequately meeting urgent government needs in scores of critical applications.

B & L aircraft quality steels, annealed and strain tempered bars, free-cutting screw stock, alloy steels and the national emergency grades, are doing their share of the job on the production front.

Our Compliments to the ASM 24th National Metal Congress and Exposition

Buying U. S. War Savings Bonds is serv V ing Your Country on the Home Front

BLISS & LAUGHLIN, INC.

HARVEY, ILL. Sales Offices in All Principal Cities BUFFALO, N. Y.

WANTED:

Your Experiences with NE Steels!

Are you using NE steels? If so, what grades are you using? How do they heat treat? What are their machining qualities? What other fabricating results can you report?

Your answers to these questions are vitally important to the war effort. The use of "lean" NE grades, already adopted in many war plants, must be further increased to conserve critical alloying elements.

Results of your fabricating experience with NE steels are requested by the War Production Board for transmission to all war industries. Additional information thus gained will widen the use of these steels and directly benefit the conservation program.

The need is urgent. If you have data to report, please relay it to your steel supplier today.

Peter A. FRASSE *and Co., Inc.*

NEW YORK • PHILADELPHIA • BUFFALO • JERSEY CITY
HARTFORD • ROCHESTER • SYRACUSE

DISTRIBUTOR OF

FRASSE MECHANICAL STEELS

SEAMLESS STEEL TUBING • COLD FINISHED BARS
ALLOY STEELS • DRILL ROD • WELDED STEEL TUBING
COLD ROLLED STRIP AND SHEETS • STAINLESS STEELS

Be sure to segregate your alloy scrap

Careful segregation and identification of alloy iron and steel scrap should be standard procedure in every plant collection program.

1. It helps conserve essential, scarce alloying elements.
2. It helps eliminate wasted time, material and effort in the steel mills.

Alloying elements such as cobalt, molybdenum, nickel and tungsten are readily recoverable from scrap. If their presence in a lot is known, the scrap can be used in making up a charge of alloy steel of the same or similar analysis. The amount of alloying elements that must be taken from stock is reduced.

But, if, through lack of segregation, alloy scrap gets into a charge where no alloys are wanted, such as a plain carbon steel, the alloying elements are utterly wasted. It is also possible that the heat itself will be lost because of failure to meet specifications.

The difficulties of scrap segregation increase with every handling. The source is the best point for segregation. Comparatively little time and trouble taken there will save a great deal of trouble and wasted time at the mill.

CLIMAX FURNISHES AUTHORITATIVE ENGINEERING DATA ON MOLYBDENUM APPLICATIONS.
MOLYBDIC OXIDE—BRIQUETTED OR CANNED • FERROMOLYBDENUM • "CALCIUM MOLYBDATE"

Climax Molybdenum Company
500 Fifth Avenue • New York City

MOLY

CAST FOR A LEADING ROLE IN INDUSTRY

This recirculating-type draw furnace permits accurate control of physical properties to attain desired characteristics.

Laboratory Methods Control the Properties of ArmaSteel*

As ArmaSteel castings advance toward the final stages of production, the methods and equipment used become more characteristic of a laboratory than of a foundry. For it is only by the most exacting control of these operations that ArmaSteel is fitted for its important role in industry.

Typical of this laboratory technique are the intricate system of automatic controls which regulate atmosphere and temperature in the radiant-gas-fired quenching furnace, and maintain accuracy of physical properties in the draw furnace . . . the constant and painstaking supervision that accompanies every precision operation . . . and the series of checks and tests, including cutting and coarse-etching, through which ArmaSteel castings must pass "all along the line." Most ArmaSteel parts are Brinelled and magna-fluxed either 100 per cent or at frequent intervals.

Close conformity to specifications, plus inherent machining advantages and performance characteristics, has made ArmaSteel castings indispensable for vital parts in many industries. With the critical shortage of steel and other materials which ArmaSteel supersedes in varied applications, it has become all the more advantageous for you to investigate the possibilities of ArmaSteel in your manufacturing operations. Our twenty-three years of practical foundry experience are at your disposal; write for catalog or consultation.

TYPICAL APPLICATIONS

Diesel pistons for heavy-duty locomotives . . . Automotive piston rings, camshafts, Hydra-Matic transmission gears, driveshaft universal yokes, clutch throw-out collars, valve rocker arms . . . Refrigerator crankshafts and connecting rods . . . Washing machine drive gears.

Saginaw Malleable Iron Division
General Motors Corporation Saginaw, Michigan

GM SAVE SERVE

*Reg. U.S. Pat. Off.

CAST FOR A LEADING ROLE IN INDUSTRY

BY FLUORESCENCE UNDER BLACK LIGHT

Zyglo

PAT. NO. 2,259,400

# indicates flaws

IN ALUMINUM, BRONZE, AUSTENITIC STEELS—ALL NON-MAGNETIC METALS

See Zyglo Inspection Demonstrated at the

NATIONAL METAL EXPOSITION,
BOOTH A-320

CLEVELAND,

OCTOBER 12-16

That American Arms and Materiel Shall Excel

● When production is urgent, inspection is doubly so. The new fluorescent methods recently announced by Magnaflux Corporation facilitate early detection of flaws—making failures predictable and avoidable. The common factor of the 3 Magnaflux methods is their use at the beginning of the production line, to save subsequent waste of time, labor and material.

The Zyglo method is particularly important under today's conditions as the first practical shop technique for inspection of non-magnetic metal parts. It is the first means applicable to aluminum, brass, etc., offering sensitivity and speed of inspection equivalent to that of Magnaflux (magnetic) inspections of steel parts.

An opportunity to see fluorescent inspection demonstrated is offered at the National Metal Exposition. Full descriptive literature is also available on request

MAGNAFLUX CORPORATION

5902 Northwest Highway, Chicago, Ill.

New York • Detroit • Los Angeles

ACCURACY

Kidd's Micrometer Agrees with Yours

Specializing for 43 years in the production of drill rods and cold drawn steels enables us to provide you with the best of material—accurately drawn and heat treated—carefully inspected and smoothly finished.

AN "EFFICIENCY" PRODUCT

Also regular and special shapes for all purposes.

Send for the chart of decimal equivalents. Write on your company letterhead. It's yours for the asking.

KIDD

DRAWN STEEL CO.

Aliquippa, Pa.

(Pittsburgh District) *Phone: Aliquippa 196*

DARWIN & MILNER, Inc.

1260 WEST 4th ST., CLEVELAND, O.

Original Patentees & Pioneers

of HIGH CARBON-HIGH CHROME

Quantity Production Steels

"NEOR"

"COBALTCROM-PRK-33"

The latter also in the form of CASTINGS

ALL KINDS OF HIGH-GRADE TOOL-STEELS

Booth C-118

NATIONAL METAL EXPOSITION

CLEVELAND, OHIO

October 12-16th, 1942

WIRE

ROUND—FLAT—HALF ROUND STRAIGHTENED AND CUT SHAPE WIRE

High Carbon Spring
Oil Tempered M.B. and H.B.
AIRCRAFT—Signal Corps & Rope Wire
AIRCRAFT—Tinned or Galvanized

Low Carbon Basic and Bessemer

Welding Wire Rods and Coils

Sizes 1/2" to No. 40 WM Gauge (.007)—All Finishes

Wire for Practically All Purposes and Requirements also SCREEN WIRE CLOTH

Highest Quality and Service Guaranteed

Established 31 Years

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The Seneca Wire & Mfg. Company

Fostoria, Ohio

Representatives and Warehouses in practically all principal cities

TO YOUR OWN SPECIFICATIONS

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- Wickwire Brothers makes wire cloth for many kinds of domestic and industrial uses—to your own specifications.
- Woven on modern, accurate looms, and made from strong, tough, rust-resisting wire.
- We use the purest zinc in our galvanizing, and the highest grades Straits tin in our tinning. We furnish many types of screen wire for the automotive industry, for such uses as cowl ventilators, grilles, filters, etc.

Furnished in
PLAIN STEEL
HOT GALVANIZED
ELECTRO GALVANIZED
TINNED
COPPER
BRONZE

WICKWIRE BROTHERS, INC. CORTLAND, NEW YORK

Lower-Carbon Ferrochromium Facilitates the Production of Chromium Steels

The use of ferrochromium containing 2 per cent carbon for the production of chromium steels in the open hearth adds less carbon to the bath. Hence less time is required to oxidize the bath to obtain the desired final carbon content. This decreases subsequent deoxidation, lowers furnace maintenance, saves furnace time, increases furnace output, and yields higher recoveries of chromium . . . In addition, lower-carbon ferrochromium inhibits the formation and segregation of hard chromium-carbide areas and produces a more uniform steel. This facilitates subsequent fabrication.

Our metallurgists can tell you more about lower-carbon ferrochromium and the many other "Electromet" ferro-alloys. They can also give you practical, on-the-job help in using these materials to improve the quality of your steel, and to increase the speed with which it can be made. This service, based on more than 35 years' experience in the production and use of ferro-alloys, is available without obligation.

ELECTRO METALLURGICAL COMPANY

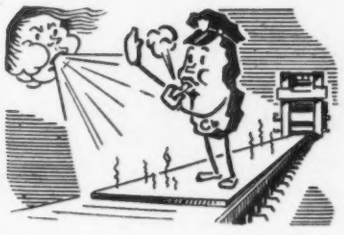
Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York, N.Y.

Items of Interest about other "Electromet" Ferro-Alloys

•

Columbium Counteracts Air-Hardening in 4 to 6 Per Cent Chromium Steels—About 0.5 per cent columbium in the low-carbon 4 to 6 per cent chromium steels effectively reduces air-hardening. This makes possible the use of these steels in the as-rolled and as-welded state without subsequent annealing. Thus columbium widens the range of usefulness of these steels and eliminates a costly and time-consuming fabricating step.



Zirconium Alloys Help Make Tough Steel – Zirconium alloys used in the finishing operation in the furnace increase the toughness and machinability of steel. Zirconium combines readily with oxygen and nitrogen and refines grain size. It improves the impact value of high-phosphorus steels and minimizes the detrimental effect of sulphur. Strong, tough steel is obtained.

Medium-Carbon or Low-Carbon Ferromanganese Reduces Age-Hardening of Sheet Steel – The use of medium-carbon or low-carbon ferromanganese instead of standard ferromanganese in sheet steel for deep-drawing reduces age-hardening of the steel and thus facilitates deep-drawing. Cracking and consequent work spoilage are minimized. In addition, this is an economical way of obtaining a lower carbon content.

Calcium - Manganese - Silicon Is a Better Ladle Deoxidizer – Calcium-manganese-silicon combines three powerful deoxidizing elements in one alloy. It is more effective as a deoxidizer and scavenger of steel than separate alloys containing these elements. Added to the ladle, it dissolves readily in the molten metal and leaves a clean, sound steel.

Use Calcium-Silicon in the Ladle for Making Coarse Grained Steels – The use of calcium-silicon as a ladle deoxidizer in rolled steels improves soundness while still maintaining a coarse grain size. Coarse-grained steels are more responsive to heat-treatment and deep-hardening, which makes it easier to control their final properties.

• • •

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Trade-Mark

Ferro-Alloys & Metals

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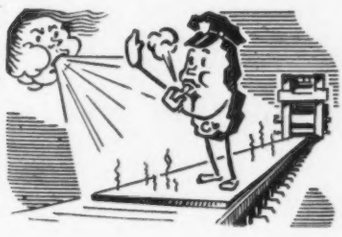

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★ Deliveries of wire are controlled by the fact that, with America at war, there is one course to follow. That course is to place at the disposal of America—and those producing for the armed forces—every bit of knowledge of wire and all the facilities for its production needed to help win this war.

We commend the thought to other manufacturing organizations that less than this 100% all-out war effort right now might well be responsible for serious losses to the allied cause, needless prolongation of war and lamentable loss of men.

To you who use **SHAPED WIRE** we suggest, also, the immediate adoption of wires of standard diameters, shapes and analyses. Special runs cause further delays in deliveries. Analyze methods with the object of reducing waste.

It is recommended that users of **WELDING ELECTRODES** make certain that they use rods of the most efficient size and of correct analysis; instruct their men to cease the practice of bending electrodes and insist that electrodes be used down to the holder.

To other users of wire we also recommend adherence to policies of standardization and conservation.

Collect every fragment of scrap, bale it and get it on its way back to the mill.

PAGE STEEL AND WIRE DIVISION
Monessen, Pa., Atlanta, Chicago,
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In Business for Your Safety

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AMERICAN CHAIN & CABLE COMPANY, Inc.
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Years of Satisfactory Quality and Service

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"GET IN YOUR SCRAP—

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. . . this headline statement is a challenge that comes to you from the thousands of steel workers throughout America. Like the men in your own plant, these steel men are doing their fighting by producing war materials in greater volume than ever before, and they are doing it largely with existing furnaces and machines. Men in steel are determined to hold *their* production records, and even to better them, so that your workers may have the steel they need.

To do this requires scrap and more scrap, and the steel workers look to you to help yourself by helping them get the scrap.

JONES & LAUGHLIN STEEL CORPORATION

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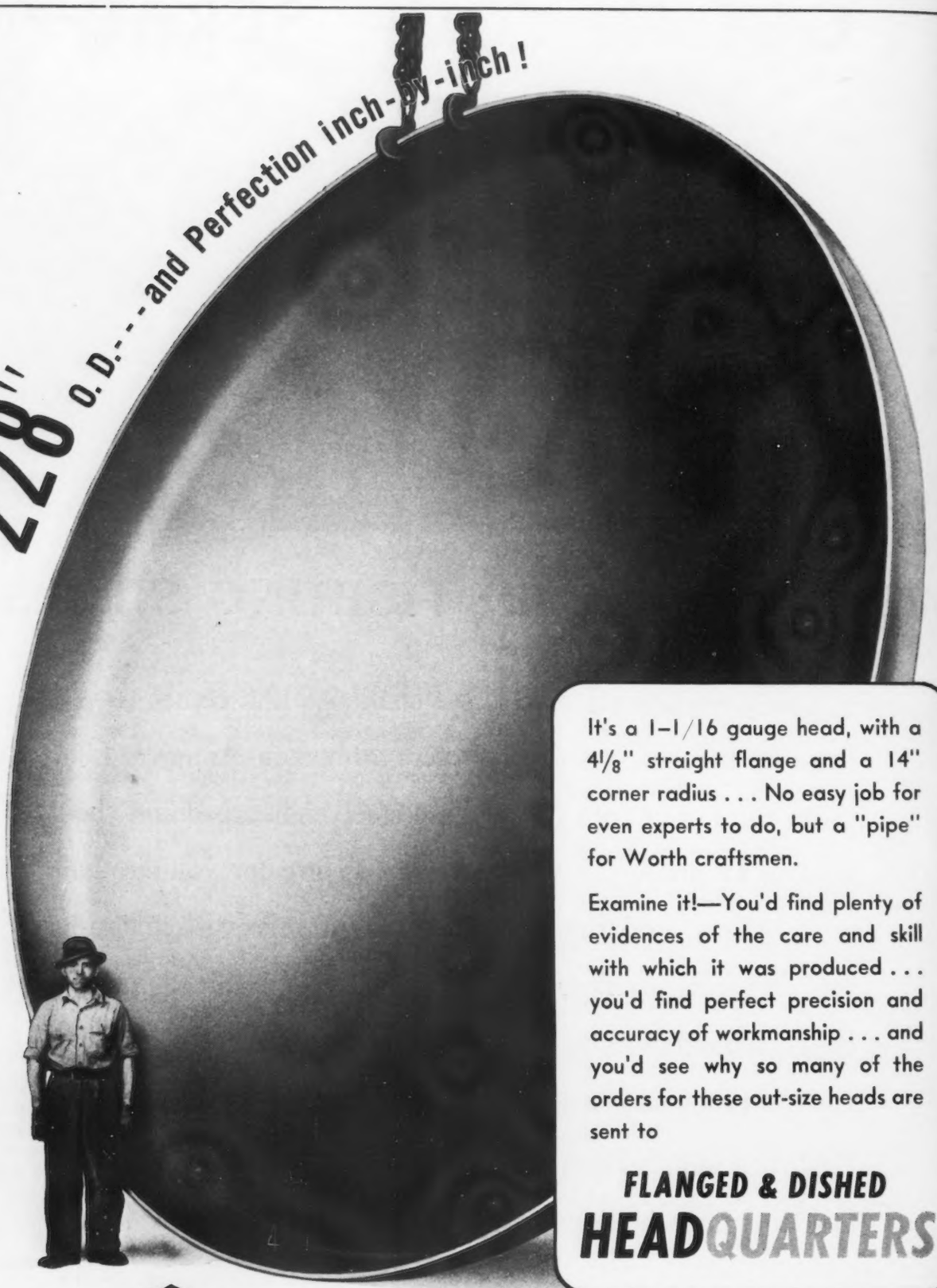
PARTNER TO INDUSTRY IN WAR PRODUCTION

J&L STEEL

228" O.D.---and Perfection inch-by-inch!



It's a 1–1/16 gauge head, with a 4 1/8" straight flange and a 14" corner radius . . . No easy job for even experts to do, but a "pipe" for Worth craftsmen.

Examine it!—You'd find plenty of evidences of the care and skill with which it was produced . . . you'd find perfect precision and accuracy of workmanship . . . and you'd see why so many of the orders for these out-size heads are sent to

FLANGED & DISHED HEADQUARTERS

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WORTH STEEL COMPANY • Claymont, Del.

— also makers of quality Sheared Steel Plates

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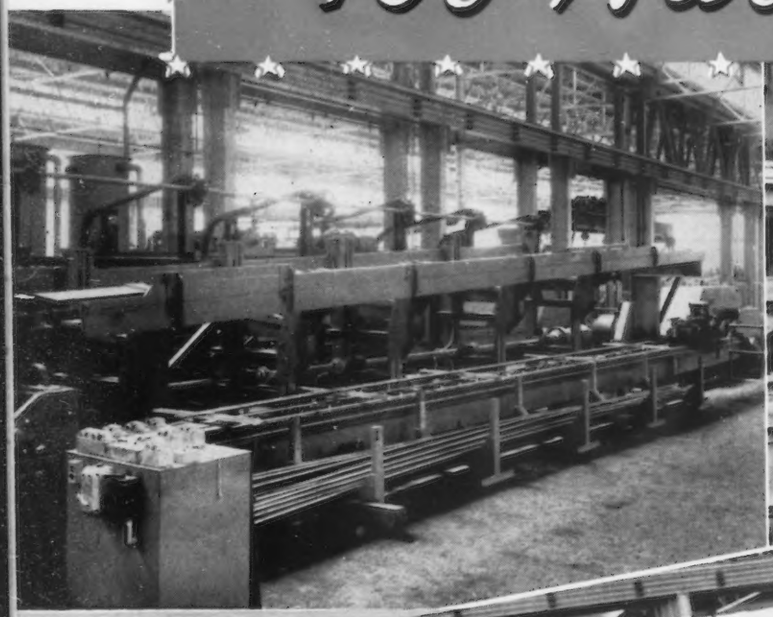
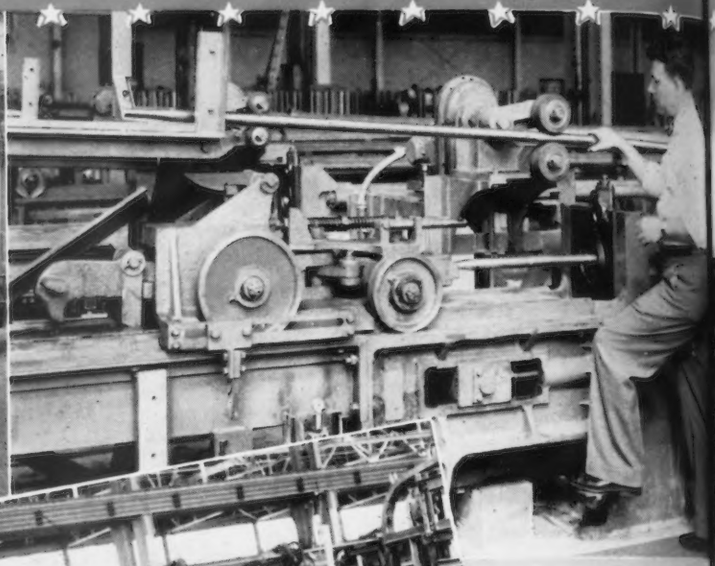
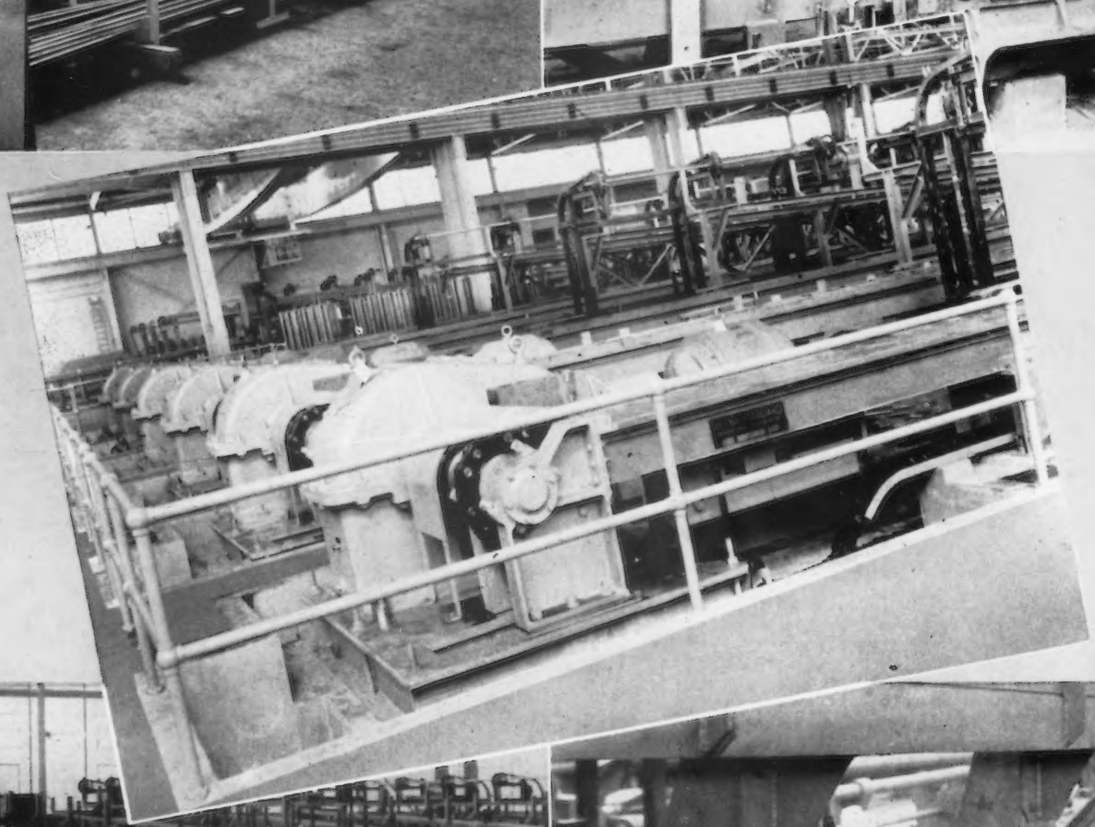
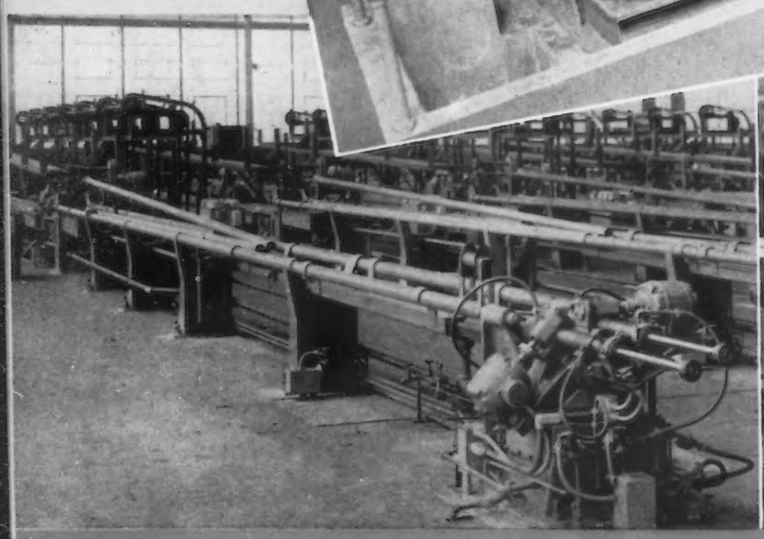
STEEL MILL EQUIPMENT

For War Production





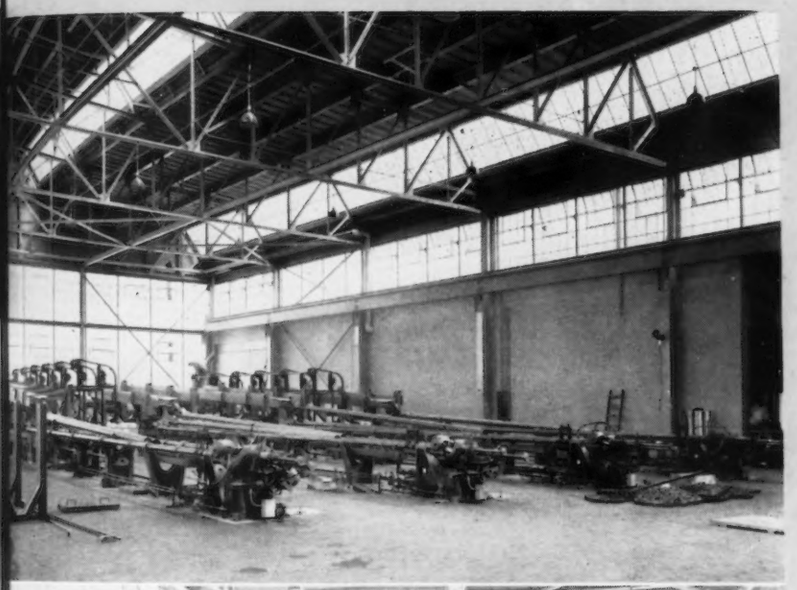


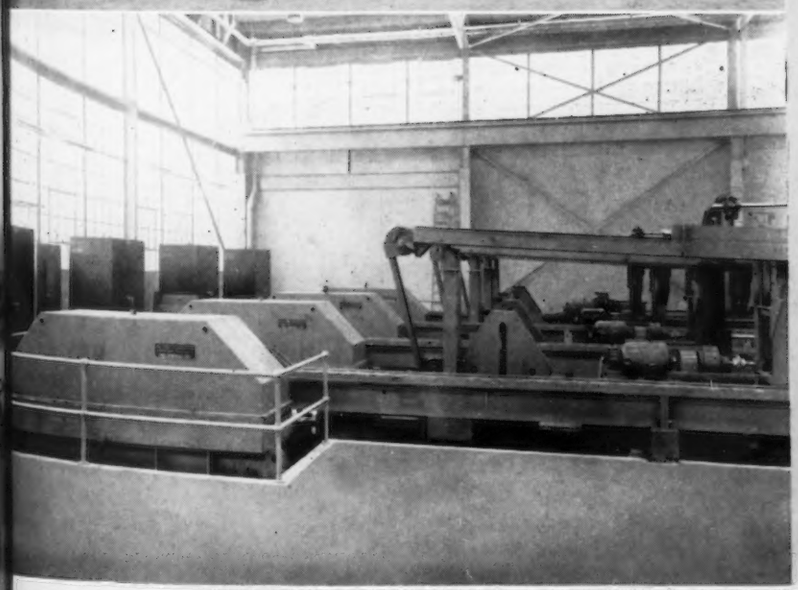


DESIGNERS AND BUILDERS TO THE STEEL,

...or Post-War Economy.

AETNA EQUIPMENT . . . FOR MAXIMUM PRODUCTION WITH MINIMUM MAINTENANCE





Shown here is a recent Aetna installation of drawbenches in the plant of a large producer of non-ferrous materials. Aetna drawbenches are designed and built to meet the urgent need for tubes, bars and rods of steel, copper, aluminum and brass for use in planes, tanks, ships and countless other requirements of modern war.

ARMY E NAVY

The AETNA-STANDARD ENGINEERING COMPANY

• YOUNGSTOWN, OHIO, U.S.A. •

ASSOCIATED COMPANIES

HEAD, WRIGHTSON & COMPANY, LIMITED, THORNABY-ON-TEES, ENGLAND •
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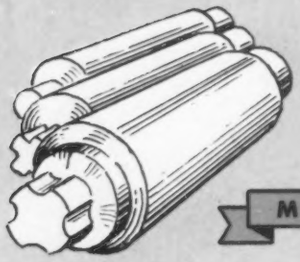
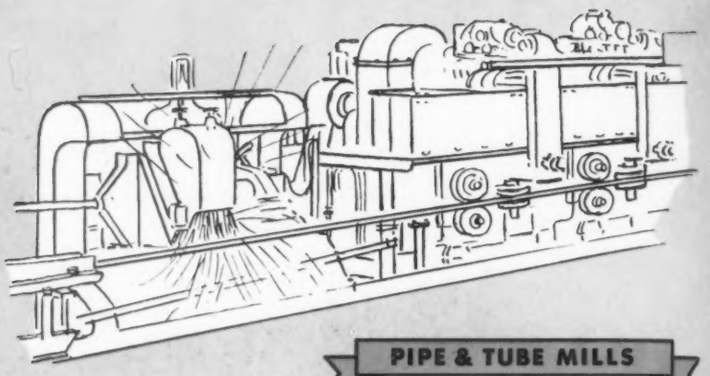
NON-FERROUS AND CHEMICAL INDUSTRIES

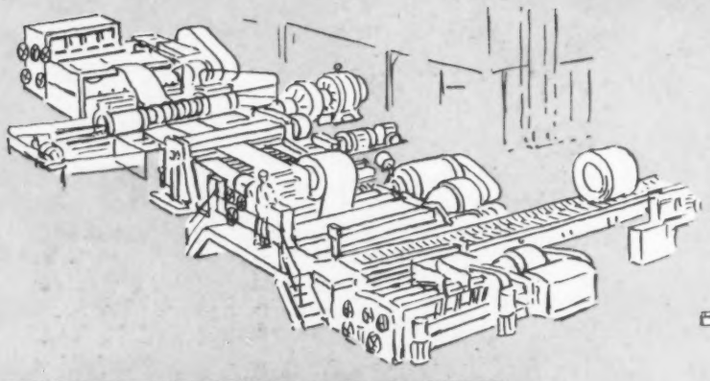
MANY OF AMERICA'S LEADING STEEL PRODUCERS RELY UPON AETNA EQUIPMENT IN THEIR VICTORY PRODUCTION



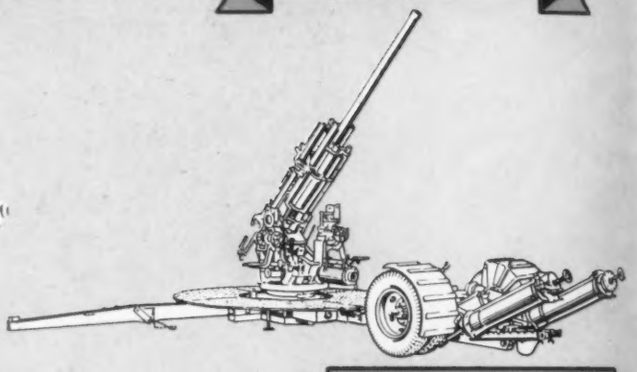
MILL ROLLS



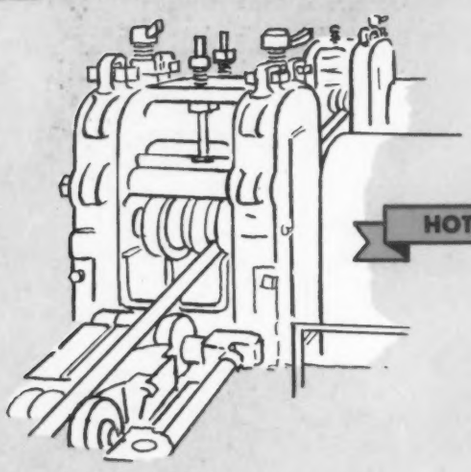
PIPE & TUBE MILLS



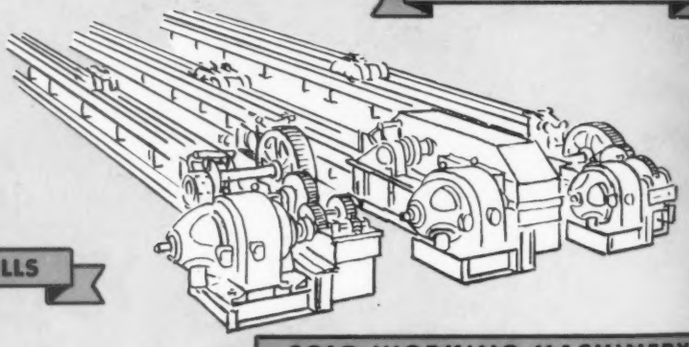
STRIP FINISHING EQUIPMENT



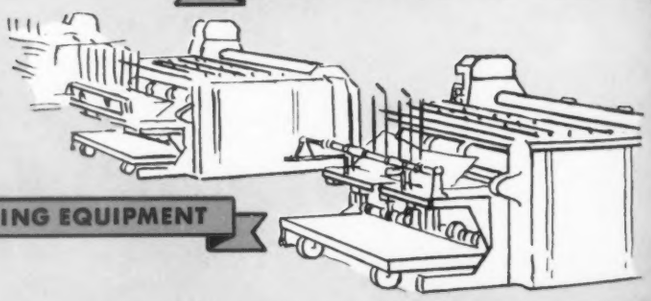
GUN CARRIAGES



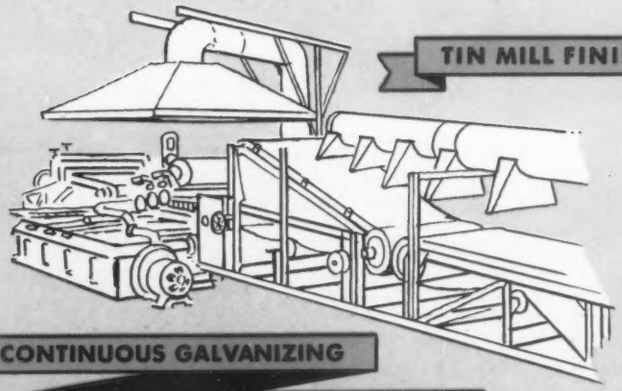
HOT ROLLING MILLS



COLD WORKING MACHINERY



TIN MILL FINISHING EQUIPMENT



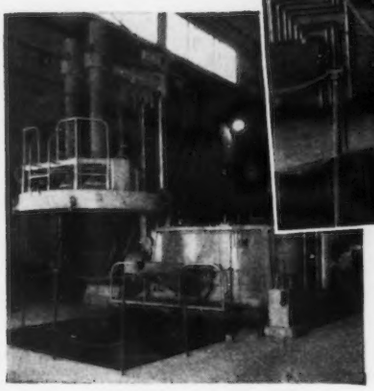
CONTINUOUS GALVANIZING AND LONG TERNE EQUIPMENT

The AETNA-STANDARD ENGINEERING COMPANY

★ YOUNGSTOWN, OHIO, U.S.A. ★

for *Efficient* Steel Production

10 ton top charge Lectromelt in normal operating position



with roof raised and rotated—ready for charging.

TOP CHARGE TYPE

in pouring position.

MOORE RAPID
Lectromelt
FURNACES

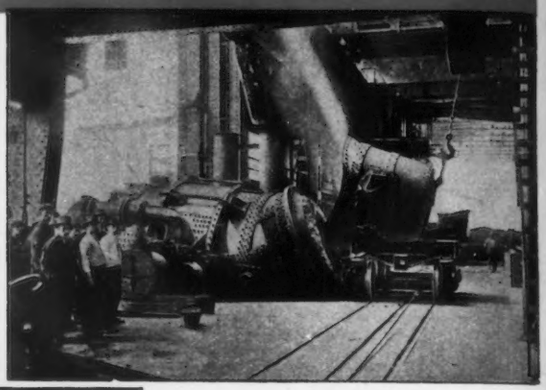
In the ingot field Lectromelt furnaces are operating 24 hours per day, producing essential steels in grades varying from the finest tool steels down to grades used for rolling directly into reinforcing bars and similar products. The furnace illustrated is a 10 ton top charge type, now in alloy steel production.

The top charge type Lectromelt furnaces produce more steel in less time and with a lower consumption of power. There are additional savings from lower electrode and refractory costs. Lectromelt furnaces are built in standard sizes ranging from 100 tons down to 25 pounds capacity. Both top charge and door charge types are available, and detailed information will be gladly furnished on request.

PITTSBURGH LECTROMELT FURNACE CORPORATION
PITTSBURGH, PENNSYLVANIA

CONVERTERS, MIXERS
TILTING OPEN HEARTH FURNACES
DUPLEX STEEL PLANTS

600-ton Mixer



25-ton Converter

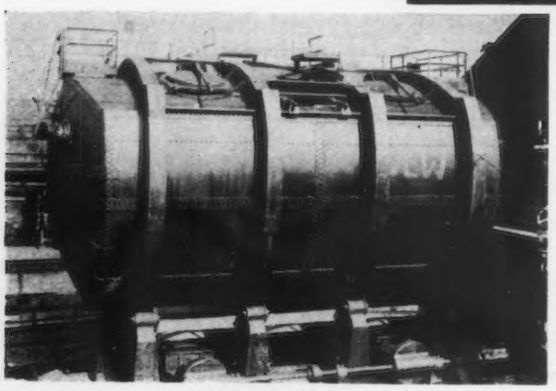
These pictures give but small evidence of Pennsylvania Engineering Works' contribution to the Steel Industry.

Backed by many years of experience and the great number of installations in the many Steel Plants, the Pennsylvania Engineering Works is prepared to design, fabricate and erect complete Duplex Plants, including Mixers—25 tons to 2000 tons capacity, Open Hearth Furnaces—50 tons to 400 tons capacity—both tilting and stationary, Converters—5 to 50 tons capacity, Converter Jack Cars, Bottom Oven Cars, Regulating Valves, Slag Cars, Ladles, Ladle Cars, Transfer Cars, Jib Cranes and Hauling Systems.

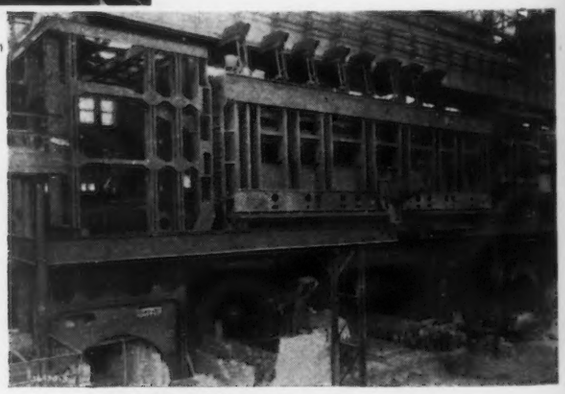
Blowing Charge in 15-ton Converter

Installations of some of the illustrated equipment at

Inland Steel Company
Tennessee Coal, Iron & Railroad Co.
Youngstown Sheet & Tube Company
Illinois Steel Company
Carnegie-Illinois Steel Corporation
Republic Steel Corporation
Bethlehem Steel Company
American Steel & Wire Company
Weirton Steel Company
Jones & Laughlin Steel Corporation
Ford Motor Company, River Rouge
Ford Motor Company, England
Broken Hill Proprietary Co., Australia
Tata Iron & Steel Company, India
Algona Steel Company, Canada
Steel Company of Canada, Ltd.
Compania Siderurgica del Mediterraneo, Spain
Cia. Fundidora de Fierro y Acero, Mexico



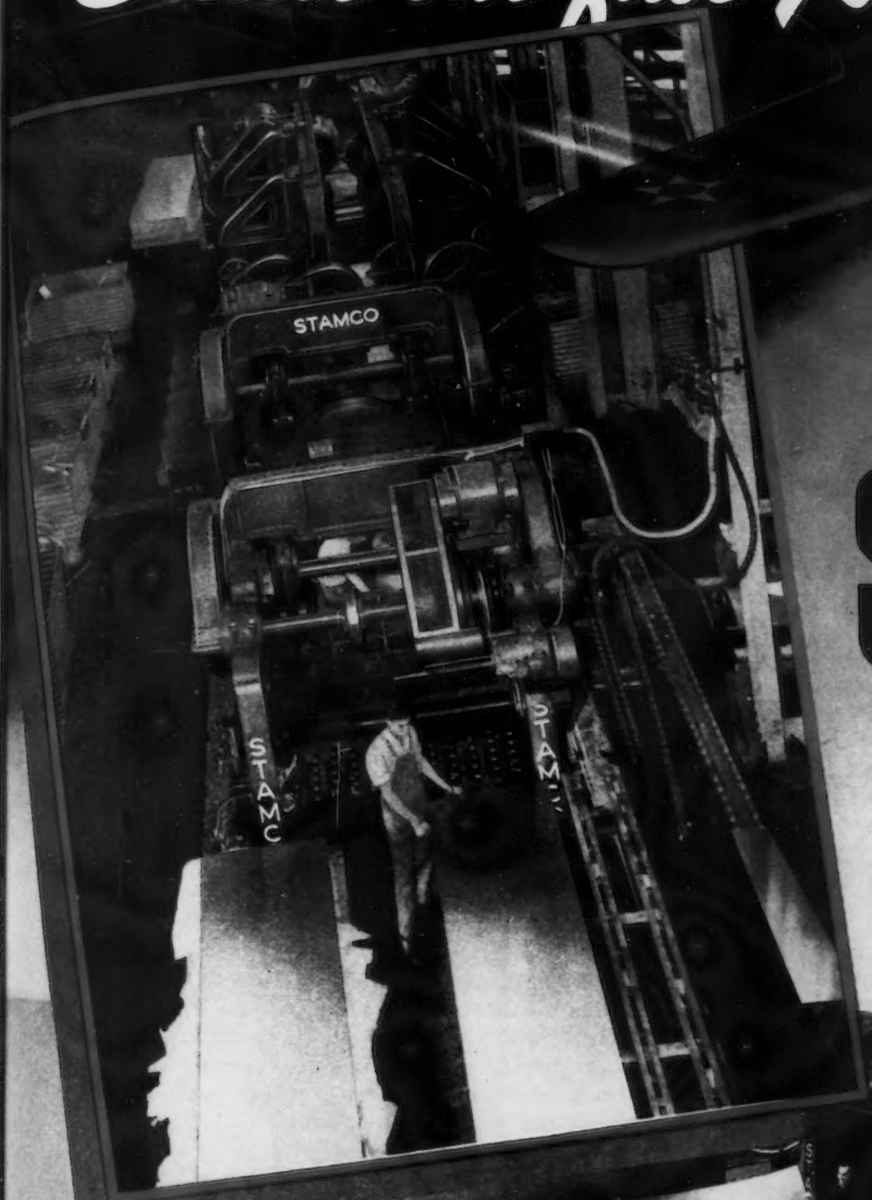
1500-ton Mixer



400-ton Tilting Open Hearth Furnace

Pennsylvania Engineering Works
New Castle, Penna.

Build 'em fast America!



ALCOA's rapidly increasing output of sheet aluminum for aircraft production has been facilitated by

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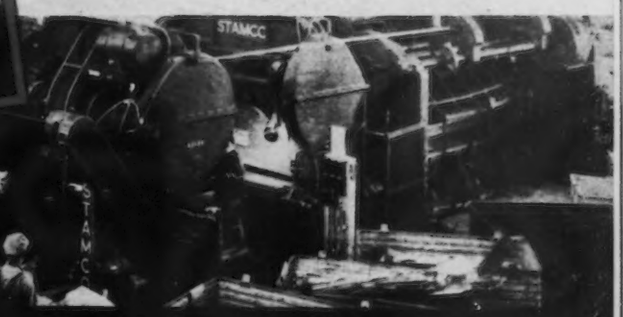
For Accuracy, Production and Economy Use Stamco Automatic Shear Lines.



LAY YOUR SHEARING PROBLEMS AT STAMCO'S DOOR

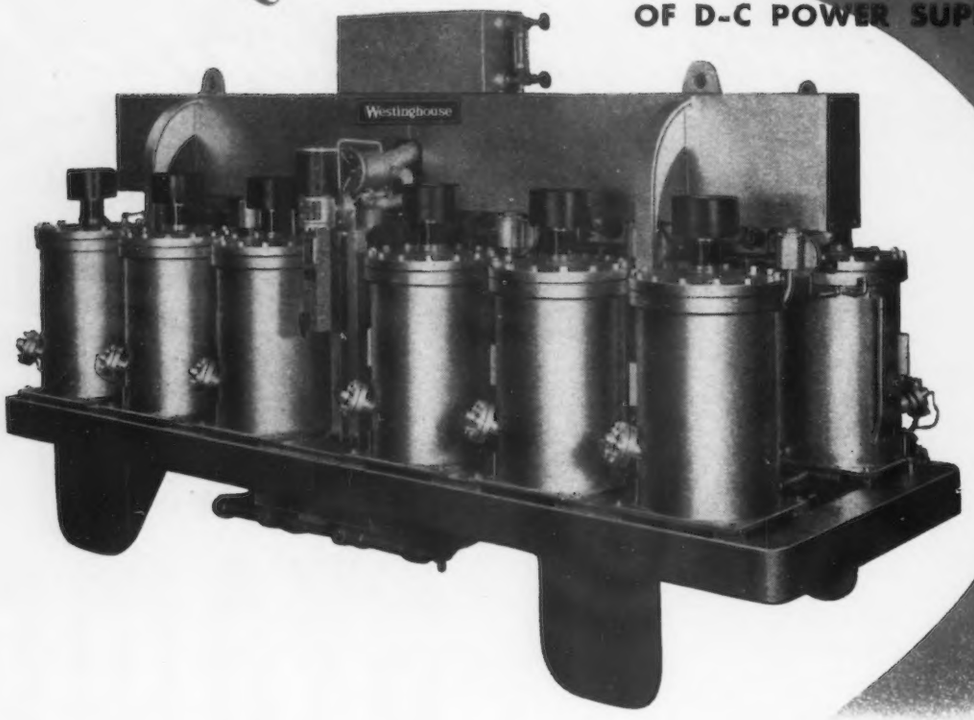
The STREINE TOOL & MANUFACTURING COMPANY

NEW BREMEN, OHIO, U.S.A.

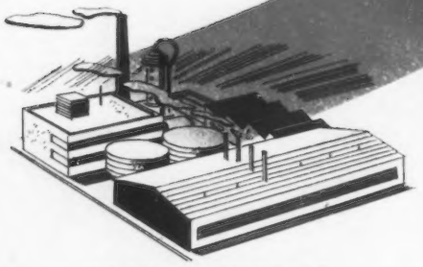
GREATER

continuity

OF D-C POWER SUPPLY



cuts production stoppages



EASY TO INSTALL

The Ignitron is compact, lightweight, can be installed on any firm, level flooring—no special foundation is required. Since it needs comparatively little space, it can be located near the load center.

To meet expanded production schedules, near 100% d-c power availability is required. And that's the performance record of the new Westinghouse Ignitron Rectifier. Delays and production stoppages are cut to a minimum. The Ignitron Rectifier provides high short-time overload capacity and circuit breaker settings may be adjusted to trip out less frequently, without fear of damage to the equipment.

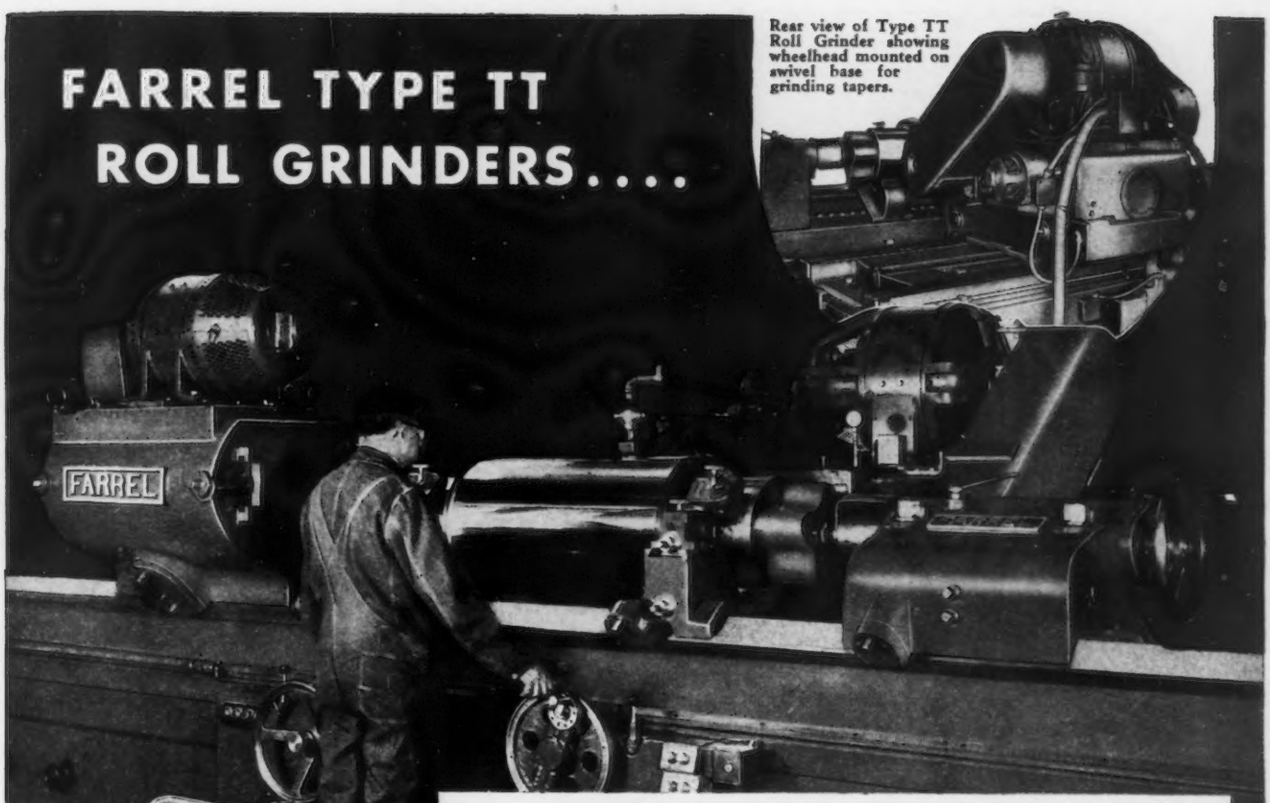
Then, too, the Ignitron requires less maintenance than rotating equipment since it has no brushes or commutators. Even the cooling system is constructed throughout of corrosion resisting materials.

Single-anode tank design solves the problem of arc voltage drop and resulting lower efficiency occurring with the multi-anode tank type rectifier. Need for grids and shields to prevent "arc-back" is reduced.

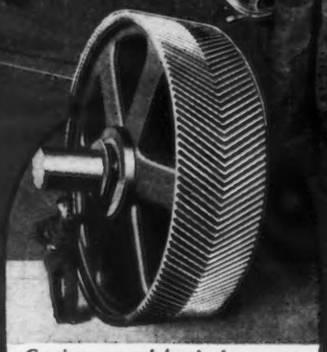
For any steel mill application requiring conversion equipment, it will pay you to investigate the Ignitron Rectifier. Write for Bulletin B-3024 today—or call your Westinghouse representative. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., Dept. 7-N. J-10219-A

—Westinghouse—Ignitron Rectifiers

FARREL TYPE TT ROLL GRINDERS....



Rear view of Type TT Roll Grinder showing wheelhead mounted on swivel base for grinding tapers.



Continuous tooth herringbone gear for rolling mill drive, 5,000 HP, weight 61,700 lbs., 145" diameter, 40" face.

Double reduction gear unit with integral 44" pinion stand for 40" x 168" reversing mill.

4,000 HP Pinion Stand for four-high reversing cold strip finishing mill.

.... INCREASE SPEED AND ACCURACY OF GRINDING ROLLS AND ROLL NECK TAPERS

The Farrel work-moving roll grinder, Type TT, grinds rolls of any material with high precision and with any desired finish that is obtainable with wheels at present available. Like other Farrel grinders, the Type TT is equally efficient in taking the heaviest roughing cuts or grinding the finest mirror finish. It produces rolls with flawless surface and with contours of exact symmetry and accuracy.

For grinding tapers on roll necks the new Farrel patented tapering attachment, which can be built into the Type TT grinder, offers several important advantages. This new taper grinding mechanism greatly increases the speed and accuracy of grinding roll neck tapers and facilitates the production of finished rolls with tapered necks for precision type sleeve bearings and anti-friction roller bearings.

All mechanical and electrical operating controls are within easy reach of the operator's station at the front of the machine, and they are so conveniently arranged that he has complete control of the grinding without leaving his position. He is thus able to maintain constant observation of the work and instant control of the machine to effect any operating change that may be necessary.

The traveling table drive is designed to secure positive, vibrationless traverse, steady travel and smooth, accurate reverse. Once set the traverse and reversal of the traveling table are automatic.

Many other features also contribute to the low-cost, high-output, high-accuracy performance of the Farrel Type TT Roll Grinder. Send for copy of new bulletin No. 113 giving full details.

GEARS AND GEAR UNITS

At the left are illustrated typical Farrel-Sykes Gears and Gear Units designed especially for rolling mill service. They provide smooth, quiet, uniform transmission of power and give unfailing, efficient performance under the severest operating conditions.

FARREL DRIVES *for* VICTORY

FARREL

REG. U.S. PAT. OFF.

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ANSONIA, CONN.

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Want a Lift?

See the Crane Section of SKF's "Steel Mill Data for Calculation and Design"!

SKF's self-aligning roller bearing with positive roller guiding is *the* crane bearing. It's compact . . . has high radial and thrust capacity . . . is unaffected by misalignment or deflection . . . requires no adjustment. SKF Industries, Inc., Philadelphia, Pa.

5125

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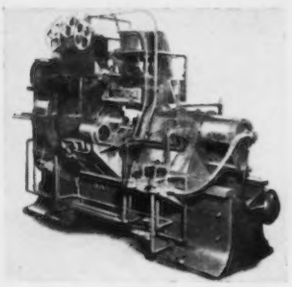
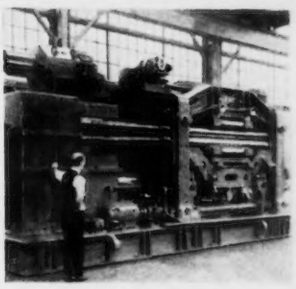
- ELECTROLYTIC & BONDERIZING TIN PLATE EQUIPMENT
- WILSON TUBE ANNEALING FURNACES
- WEAN VACUUM CUP SHEET AND PLATE LIFTERS
- CONTINUOUS STRIP PICKLING, SLITTING, SIDE TRIMMING, AND RECOILING LINES

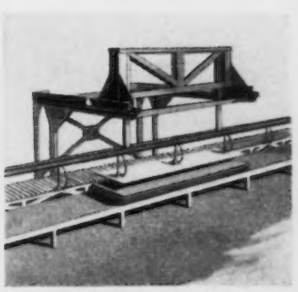


Shell and Sleeve Lathe



Armor Plate Leveller

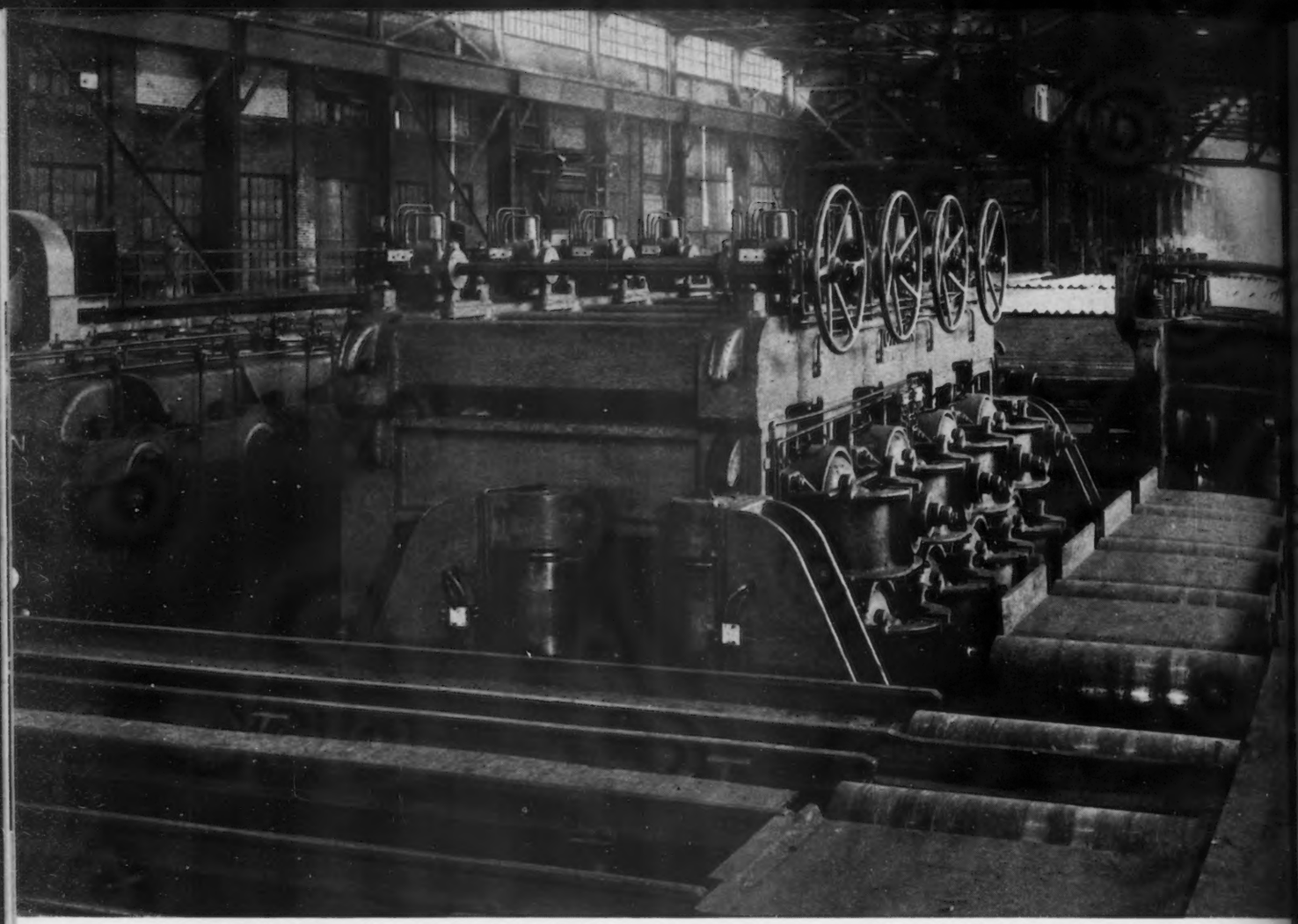
Wilson Tube Type Annealing Furnace



Wean Vacuum Cup Sheet and Plate Lifter

For Victory!

SUBSIDIARY COMPANY FOR GROSSE CONSTRUCTION CO., CLEVELAND, O., MFRS. OF STRIP AND WIRE MILL MACHINERY



24″ I BEAM STRAIGHTENER

● Illustrated is a Morgan Roller Straightener for structural shapes up to 24″ I beams.

It is equipped with four top and four bottom rolls, all of which are adjustable. These eight rolls are arranged to be connected by spindles to a separate enclosed gear box drive. All gear shafts are mounted in roller bearings. Vertical rolls are provided on both entry and delivery sides.

A section of roller table is mounted on one side of straightener to be shifted into the roller table line when straightener is not in use.

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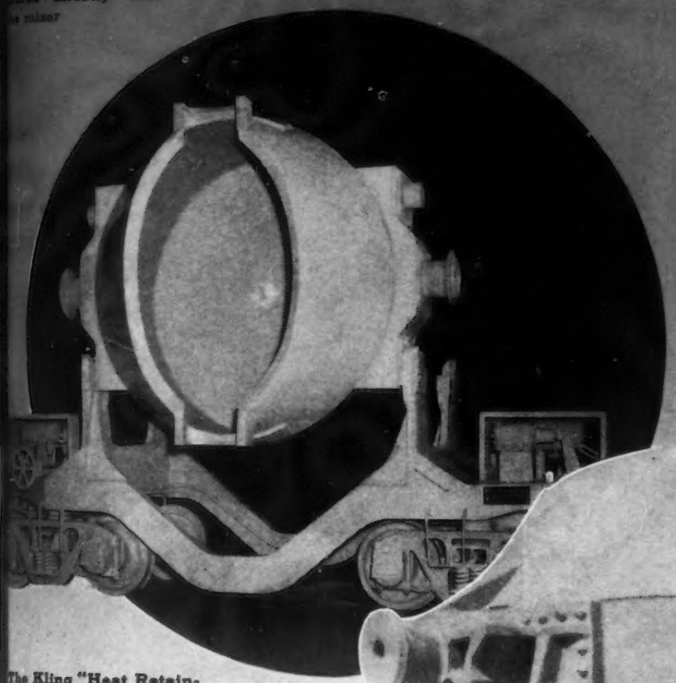
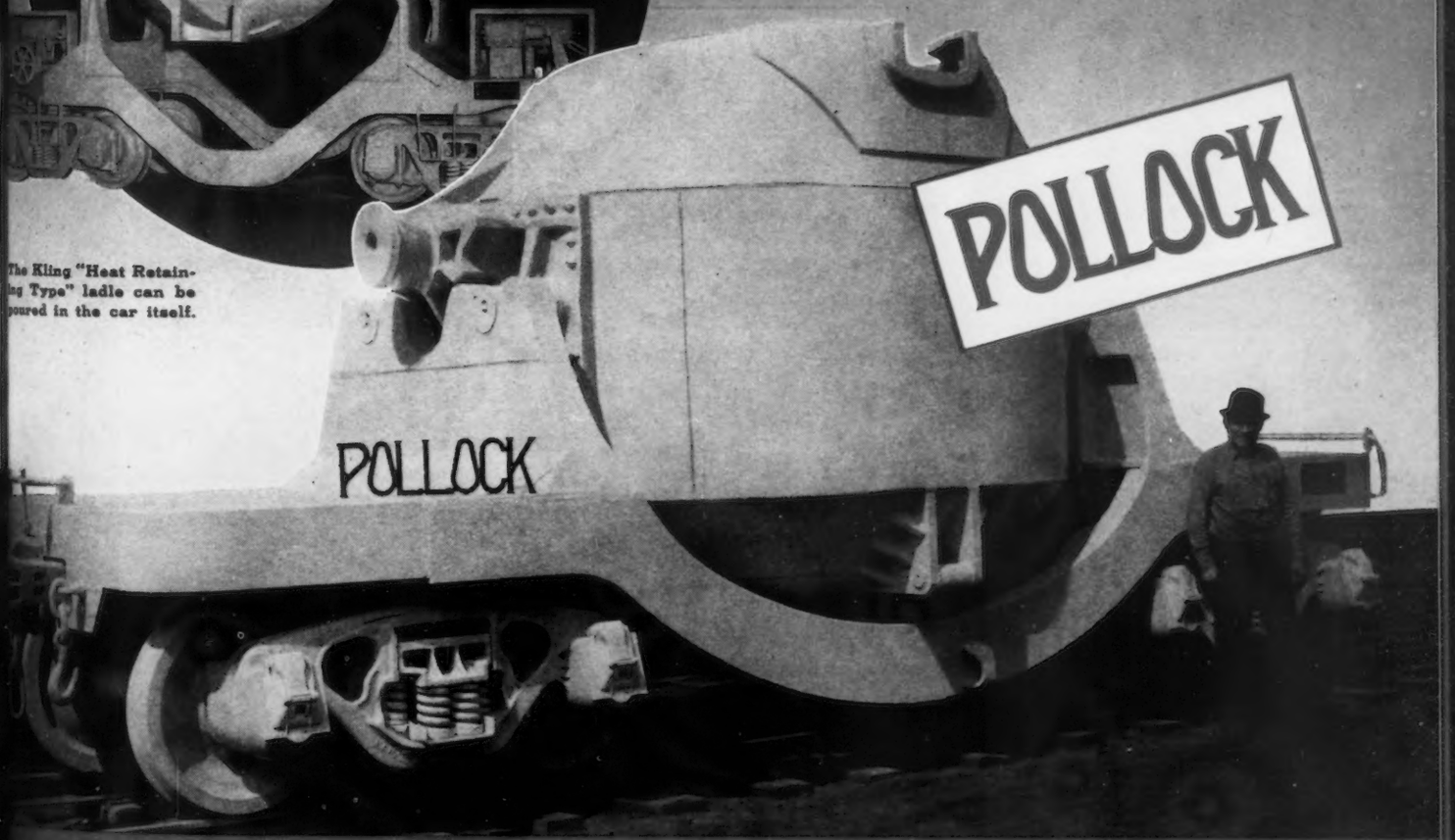
Efficient BLAST FURNACE OPERATION Demands EFFICIENT HANDLING EQUIPMENT

Your modernized blast furnace plant must have up-to-date iron ladle cars. Specially built Pollock ladle cars will give you the best results at the lowest cost.

Call in the Pollock Company to help analyze your iron handling problem and at the same time ask them to show you the many different types of iron ladle cars they can build for you. They are used throughout the steel industry.



The Kling "Heat Retaining Type" ladle can be poured in the car itself.



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YOUNGSTOWN, OHIO

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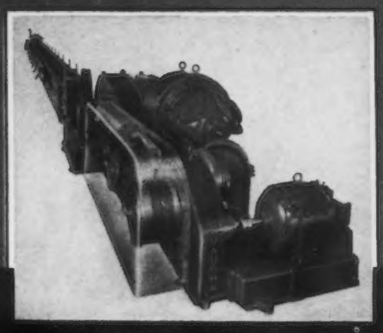
VAUGHN's precision manufacturing prepares you for PRECISION PERFORMANCE

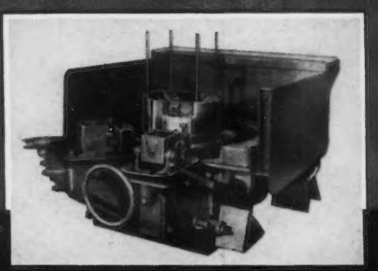
FROM top to bottom of every wire mill today runs the command "Get it out fast and get it out right"—no time for anything less!

With tough specifications and delivery dates to meet, the ability of your wire drawing machinery to permit *precision* in production—coupled with faultless *high speed performance* in boosting output—becomes the measure of your capacity to serve. Vaughn Machinery offers you the maximum—day in and day out, for the duration and afterward.

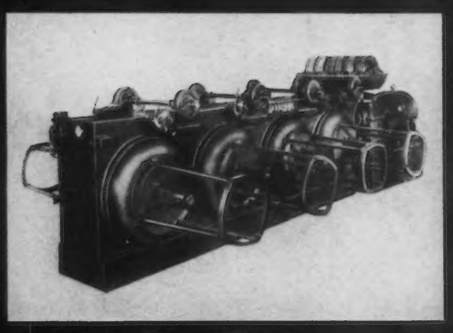


Draw Bench

Motoblox

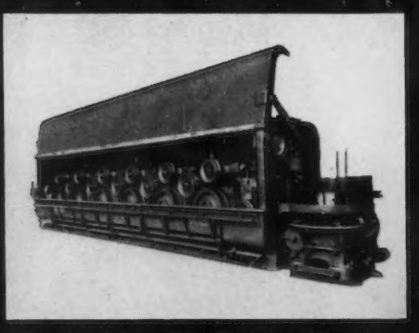


Motobloc



Take-up Frame

Cone Machine



Special Heavy Wet Drawing Motoblox

The VAUGHN MACHINERY CO.

CUYAHOGA FALLS, OHIO, U. S. A.

COMPLETE COLD DRAWING EQUIPMENT - CONTINUOUS OR SINGLE HOLE -
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UTMOST production of high-grade alloy steels is essential to our country's success in this war of machines. To keep ships, tanks, planes, and guns moving to far-flung fronts in sufficient quantities calls for top performance by the men and equipment in America's metal producing industries. Heroult furnaces are doing their part in this critical war job, augmenting the flow of war materials which must keep pace with the production of fighting equipment.

All our available resources have been mustered to speed the construction of this highly efficient melting and refining tool. New Heroult furnaces are going into operation continually, taking their places beside veterans, many with service records up to 30 years. Their capacities range from 1 to 100 tons, and production records demonstrate their superiority in the field.

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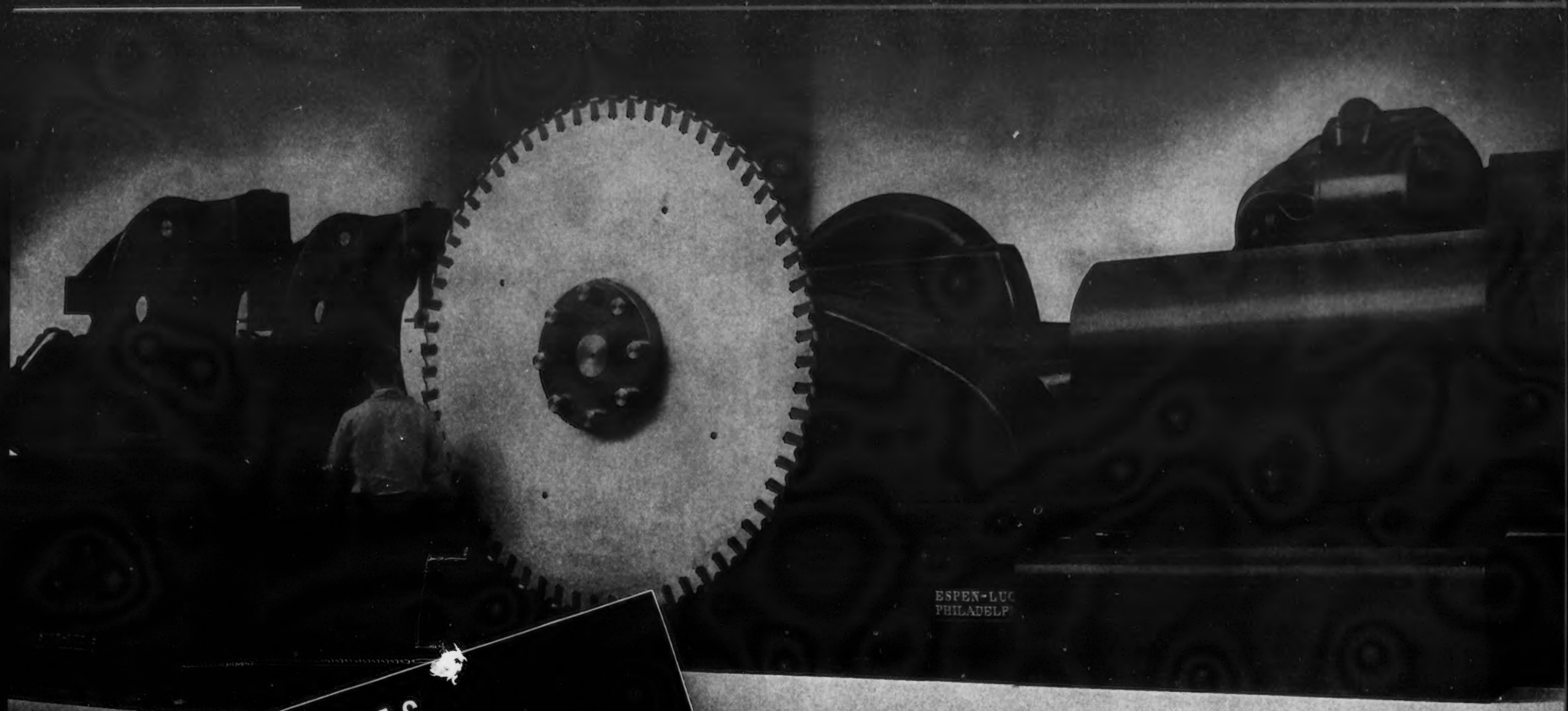

ESPEN-LUCAS HEAVY DUTY COLD SAW CUTTING-OFF MACHINES

This forge-type sawing machine is equipped with a hydraulic system for saw carriage feed and quick recovery. The heavy cuts at fast speeds that can be taken in hard and tough alloy steels result in high production to meet today's heavy demands.

We build a hundred-odd types of cold saw cutting-off machines for sawing large sections.

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RED CIRCLE Rolls CHILLED

"Red Circle" heat treated Alloy and Plain Chilled Rolls for three and four-high Mills, Sheet and Tin Mills. Moly Rolls, Nickel Chilled, Grain Rolls, Cold Rolls and Sand Rolls.

Sheet and Tin Mill Shears of all kinds. Roll Lathes, Steam Doublers, Sheet Pack Carriers, Stretcher Levellers and Rolling Mill Machinery built to specifications.

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ESPECIALLY DESIGNED FOR THE

STEEL INDUSTRY

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For temperatures from 800° to 2000°

Where you are marking steel at high temperatures, you will find that HOTMARX offers a real economy. Especially designed for use on steel at high temperatures, it fuses to the right degree of permanency and cools to perfect legibility.

HOTMARX does not blur and drys out to a clearly legible white. A stick of HOTMARX lasts about twice as long as ordinary crayons. Ask for Series 1065—HOTMARX—in white, black, and dark red.

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The standard crayon in the steel industry for marking on metal below 800°. Clear, legible, long lasting, METAL MARK is manufactured in five clearly distinguished colors. Ask for Series 891.

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NEW YORK SAN FRANCISCO DALLAS

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for STEEL MILL SERVICE are sold under LIBERAL GUARANTEES

Specially built of alloy steels for handling heavy ore, slag, scale and skull cracker pit service. All-welded construction at vital points. Catalog FREE.

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LOFTUS ENGINEERING *corporation*

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METAL TREATING AND FINISHING

Six OUTSTANDING

★ WHEREVER HEAT IS USED IN INDUSTRY, LOOK TO SC FOR MODERN ENGINEERING FEATURES . . . MONEY SAVING, TIME SAVING DEVELOPMENTS . . . THE RESULT OF 35 YEARS' EXPERIENCE IN BUILDING HEATING AND HEAT TREATING EQUIPMENT

It is neither coincidence nor accident that America's steel industry at war relies on Surface Combustion for its heating and heat treating equipment.

SC production schedules are geared to war needs. SC delivery commitments mean what they say and dates are met unfailingly. Even more important to the war program, SC equipment has the features that the emergency demands to produce tremendous volumes of war material of uniformly high quality, at a continuing high rate, and at low cost.

Fortunately, for all of us, these unique SC features had been perfected years before, for peace-time production. To adapt them for war was simple. They are the cumulative result of a generation's work in research and engineering development.

A FEW NOTEWORTHY CONTRIBUTIONS TO SCIENTIFIC HEATING AND HEAT TREATING

1 ORIGINAL ONE-WAY FIRED SOAKING PITS. The first improvement in soaking pits was the SC One-Way Fired Pit. Today, over two hundred of these pits are operating and being built in America's leading steel mills. Firing is in one direction—above the ingots. Heat travels in horseshoe fashion, enveloping ingots and providing uniform heating. Scale conditions can be regulated much more closely because of uniform heating and accurate atmosphere control. Complete automatic control of temperature, pressure and atmosphere is provided.

2 TRIPLE-ZONE SLAB HEATING as developed by Surface Combustion in SC furnaces is helping in the establishment of new records in fuel economy and continuous service. Over and under firing has greatly increased furnace output and product quality . . . keeps mills rolling better, and faster. Complete automatic temperature and combustion control is provided in all zones.

3 THE WALKING BEAM and other material handling mechanisms. No matter how severe the service these SC mechanisms stand up. They move through high temperatures, without lubrication. They travel at variable speeds, under close control. Whether walking beam, disc type or chain type conveyor, roller hearth or pusher or any other type, you can be certain SC mechanisms will work dependably and with minimum attention.

4 PREPARED ATMOSPHERE UNITS. Perhaps the greatest single contribution of gas to heat treating is the accurate, scientific control of atmospheres. With SC Furnaces, metals are hardened, annealed or carburized with exactly the right degree of heat and exactly the right mixture of gases. Outstanding SC developments are the DX, RX, and Char-Mo atmosphere units.

5 RADIANT HEATING ELEMENTS. It is this unique development which permits the utilization of gas in large controlled-atmosphere furnaces. Gas burns in a long, luminous flame within an alloy tube. Work is entirely protected from all products of combustion making it possible to utilize the atmosphere best suited for the work. Scale and decarburization are entirely eliminated.

6 FORCED CONVECTION HEATING. This efficient method of high temperature heating was introduced several years ago in a Surface Combustion furnace built for a steel mill. Now it is used throughout the metal working industry. Forced convection heating removes temperature limitations, eliminates distortion, simplifies material handling, increases production, saves floor space and reduces operating costs.

SURFACE COMBUSTION • TOLEDO, OHIO

AT THE METAL SHOW
WE WILL WELCOME THE OPPORTUNITY OF DISCUSSING YOUR HEAT TREATING PROBLEMS WITH YOU.
BOOTH No. D-118

SURFACE COMBUSTION

MANUFACTURERS OF INDUSTRIAL FURNACES • JANITROL GAS-FIRED SPACE HEATING EQUIPMENT • AND KATHABAR SYSTEMS FOR DRY BLAST

G SC DEVELOPMENTS

1 ONE-WAY FIRED SOAKING PITS
2 TRIPLE-ZONE SLAB HEATING
3 AUTOMATIC MATERIAL HANDLING MECHANISMS
4 GAS PREPARATION UNITS
5 RADIANT HEATING ELEMENTS
6 FORCED CONVECTION HEATING
CUT DOWN MAN HOURS... SPEED UP PRODUCTION ON BOMBS, BOMBERS AND BATTLESHIPS FOR Victory!

A SMALL FURNACE WITH BIG QUESTIONS

- ★ What type of refractory should be used?
- ★ What effect will slag have upon the refractory lining?
- ★ How can the refractory be protected against erosion?
- ★ How can the load-carrying ability of the floor brick be judged?
- ★ What will be the heat losses due to periodic operation?
- ★ What is the best type of arch or roof support for this furnace?
- ★ What precautions should be taken against the effects of expansion and contraction?
- ★ Will heat losses through the structural steel be great? How can they be minimized?
- ★ Should the brick be laid with a heat-setting or an air-setting mortar?
- ★ What type of wall anchoring, if any, is most suitable?
- ★ What protection, if any, should be provided against flame impingement?

B&W Refractories Engineers Answer Questions Like These Every Day.

THE BABCOCK & WILCOX COMPANY
Refractories Division
85 Liberty Street New York, N. Y.

B&W Refractories Engineers are qualified to give advice on furnaces like the one illustrated, or on stress-relieving units that employ as many as 80,000 B&W Insulating Firebrick. Their advice is free and without obligation.

R-157

BABCOCK & WILCOX

BULLARD-DUNN PROCESS . . . .

ELECTRO-CHEMICAL DESCALING OF METALS

Being used extensively on war products requiring complete descaling, no etching, no dimensional changes, clean recesses, chemically clean surfaces for plating, blackening, Parco Lubrizing and the like. Speeds up descaling operations, reduces labor required, produces best possible product. War products include airplane engines, machine guns, shells, gun mounts, airplane propellers, tank transmissions, aviation instruments, airplane control bearings.

When the war is over it is still the method for Peacetime products.

BULLARD-DUNN PROCESS DIVISION
of THE BULLARD COMPANY
BRIDGEPORT · CONNECTICUT · U. S. A.

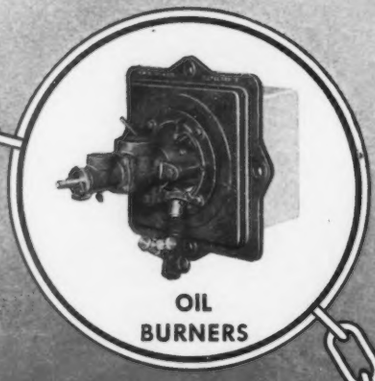
BULLARD

BULLARD-DUNN Process

NORTH AMERICAN
COMBUSTION EQUIPMENT

Will save fuel for your country and your company!

GAS BURNERS


OIL BURNERS

ADJUSTABLE PORT VALVES

DESIGNED
TO WORK TOGETHER
AS A UNIT GIVING YOU
ONE
SOURCE OF SUPPLY
ONE
RESPONSIBILITY

TURBO BLOWERS

SENSITROL OIL and BUTTERFLY AIR VALVES

RATIOTROLS and REGULATORS

Why not consult a North American representative?

THE NORTH AMERICAN MANUFACTURING COMPANY
MANUFACTURERS OF INDUSTRIAL FUEL BURNING EQUIPMENT FOR GAS OR OIL
BRANCH OFFICES *with* FIELD ENGINEERS *in* PRINCIPAL CITIES
CLEVELAND, OHIO

WHY DOES YOUR FURNACE PREVENT DECOMPOSITION OF CARBURIZING SALTS?

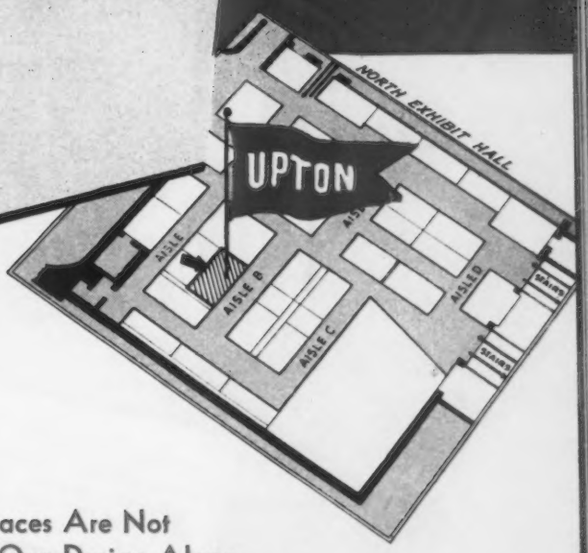
WHY CAN YOU PREDICT SIZE CHANGE SO ACCURATELY?

Get all the Answers at the Upton Booth B-424

HOW WOULD YOU TREAT AN IRREGULAR SHAPE LIKE THIS?

HOW DO YOU HOLD TEMPERATURES SO CLOSE?

ee the pton Furnace in operation



COOL ENOUGH FOR THE SHOW— FAST ENOUGH FOR THIS WAR!

See a demonstration of the accurate, dependable, high production speed heat treating possible with an Upton Electric Salt Bath Furnace. One of these furnaces will be in actual operation at the National Metal Exposition at Cleveland, October 12 to 16.

Because an Upton furnace is cool to work around, it will be in operation at the show. This coolness, which permits good working conditions, also means that the insulation is exceptionally good and that the Upton furnaces are very efficient. (An Upton furnace will save you upwards of $1200.00 a year in fuel costs alone.)

Because the heating medium is always in contact with the entire surface of the work, heating is more uniform and faster. That's why Upton furnaces are helping hurry war production.

Bring a Sample of the Work or Print

If you have a piece of work that you would like to have us treat for you, bring it along. If you don't have a sample, bring a print, or a sketch.

Upton Furnaces Are Not Limited to One Design Alone

Upton Electric Salt Bath Furnaces are internally heated and are available in two separate styles.

Low Temperature Range

These furnaces usually have the sloping rear wall with the electrodes laid on insulating bricking on the sloping wall. This eliminates superheating which decomposes carburizing salts. There are other advantages to this design.

High Temperature Range

Usually with electrodes in diagonally opposite corners, the Electrothermic-Permeation principle of this design permits uniform heating of salts up to 2500°F throughout the *entire* bath. Ideal for High Speed Steel—Moly or 18-4-1.

If you can't come to the Show, send NOW for complete information on Upton Furnaces.

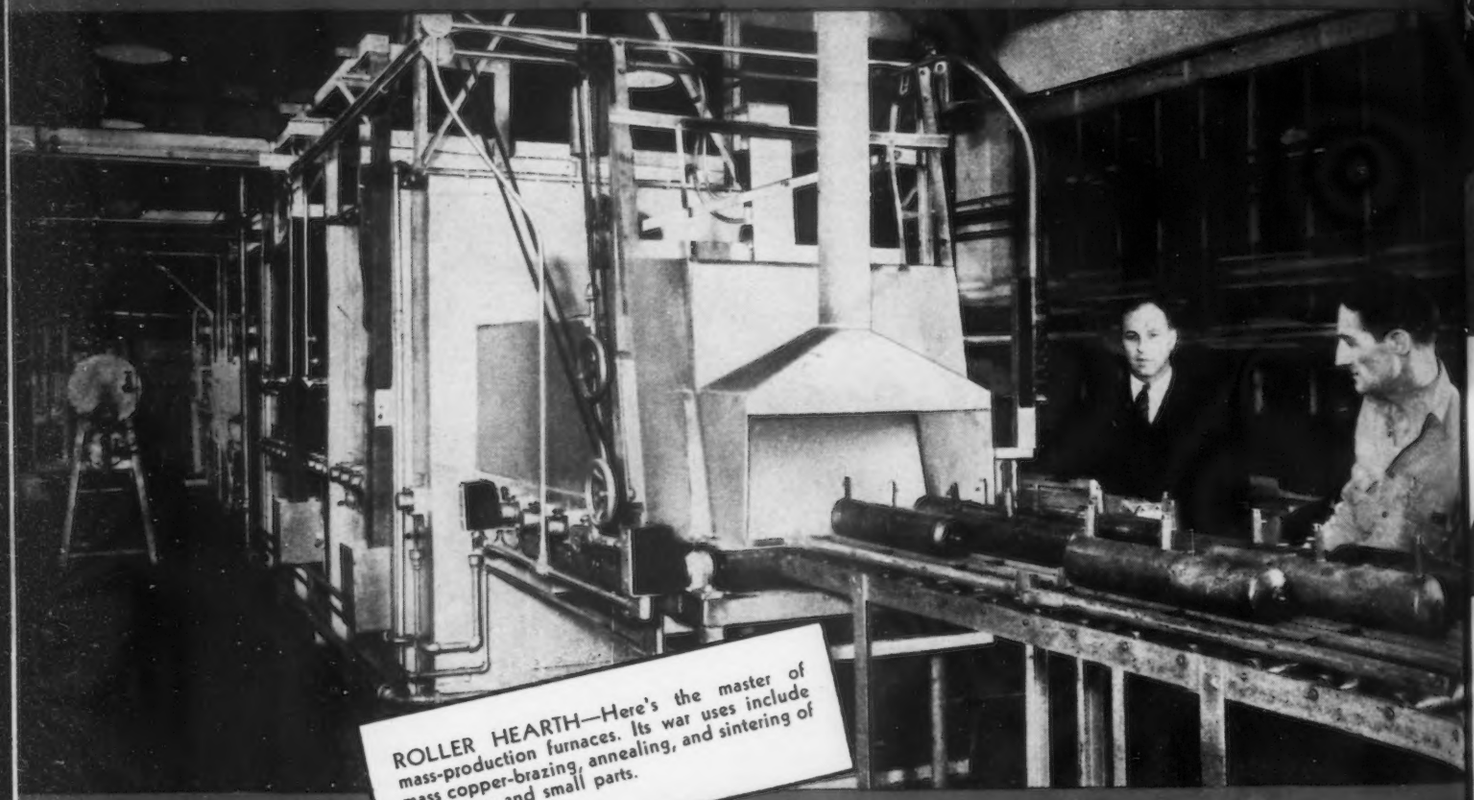
UPTON ELECTRIC FURNACE DIVISION

Commerce Pattern Foundry & Machine Company

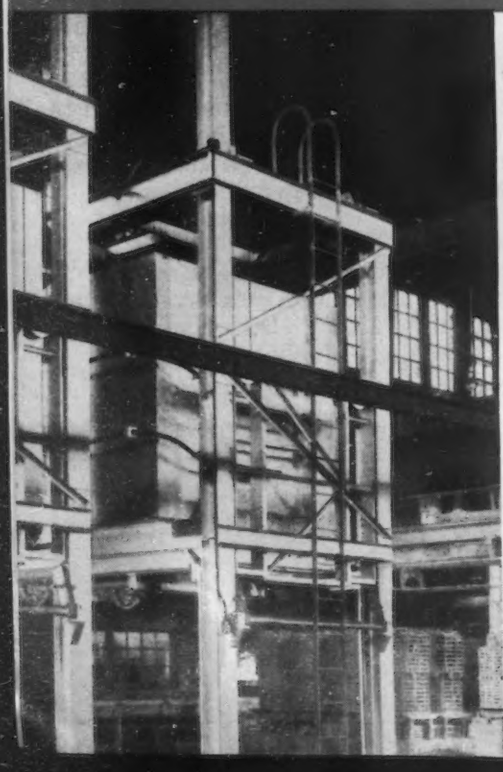
We build the furnace using the ELECTROTHERMIC-PERMEATION principle of operation

7443 MELVILLE at GREEN • DETROIT, MICHIGAN

FURNACES FOR *Mass Production*



ROLLER HEARTH—Here's the master of mass-production furnaces. Its war uses include mass copper-brazing, annealing, and sintering of both large and small parts.



MESH BELT—Here's the furnace for copper-brazing, bright-annealing, normalizing, drawing, or sintering lightweight parts. Does the job in one continuous operation.

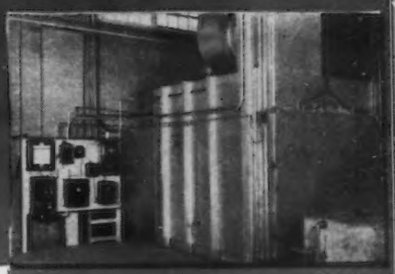
ELEVATOR FURNACE—For annealing malleable castings, steel castings, tubing, cast iron, sheets, and similar work. Big time saver.

CONVEYOR HARDENING—Here's the furnace recommended for fast, scale-free hardening without decarburization. Just put the parts on a conveyor, and they will go through without further attention.

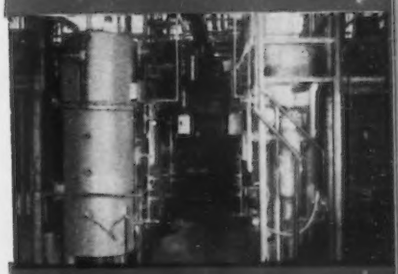
ROTARY HEARTH—This furnace is recommended for parts that require individual handling. Used largely to heat-treat gears, and similar work

PUSHER FURNACE

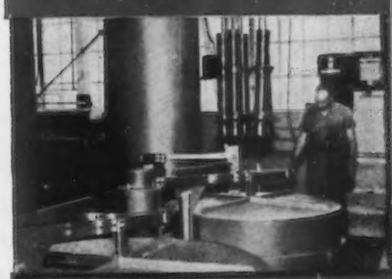
CAR-BOTTOM FURNACE



BOX-TYPE FURNACE

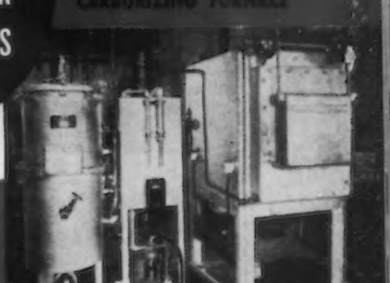


ATMOSPHERE EQUIPMENT



PIT FURNACE

CARBURIZING FURNACE



BOX FURNACE & DRYCOLENE PRODUCER

4 Reasons Why G-E Furnaces Assure Fast Heat Treating

1. Continuous Operation

No handling of the parts is required from the time they are put into the furnace until they are discharged. One continuous and complete operation puts all parts through same temperature, same atmosphere, and same time cycle. This assures high uniformity and fast mass production.

2. Scale-free Work

All of these furnaces can be used with protective atmosphere, thus eliminating subsequent cleaning operations. Time and labor are not wasted in rejections and inspections.

3. Little Operation Labor

After loading the work on conveyors, automatic controls put it through the proper time, atmosphere, and temperature cycles. Elimination of handling speeds operation and saves valuable labor.

4. High Heating Efficiency

Easy confinement of heat within the furnace assures low heat losses. Provides comfortable working conditions, too. Thus, valuable time is not wasted.

Have You a Heat-treating Problem?

These mass-production furnaces are built to do your heat treating uniformly and fast and to stay on the job. They are available in standard designs; specials can be designed to fit your needs. For more information get in touch with the nearest G-E office. Our engineers will make a study of your problem and recommend the furnace for the job, selected from dozens of tested and proved types. *General Electric, Schenectady, N. Y.*

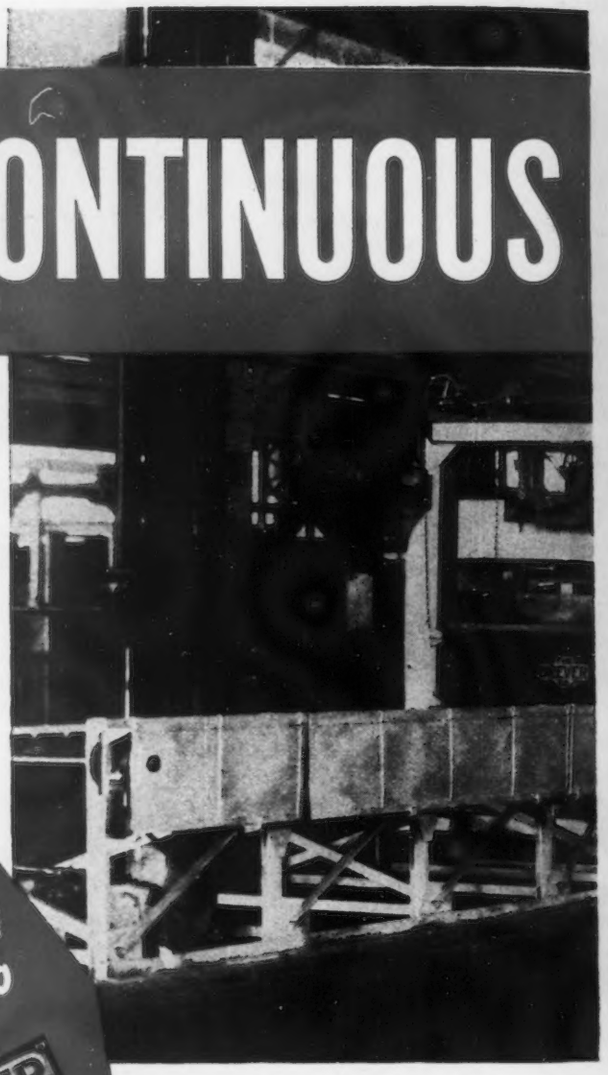
MORE THAN 30 TYPES OF FURNACES FOR INDUSTRIAL NEEDS

The Navy "E", for Excellence, has been awarded to 92,780 General Electric employees in six plants manufacturing naval equipment.

GENERAL ELECTRIC

DREVER CONTINUOUS

A Drever Continuous Furnace Line is the modern means of carrying materials through successive heat treating operations with minimum manual handling and consequent minimum time loss between operations.



Material movement from one unit to the next in line is controlled from central pulpits, with all phases of treatment under convenient control by the operators.

Some of the advantages of this straight line production equipment are listed below.

1. HIGH PRODUCTION RATE:

(a) Material handling between related units is mechanical, insuring minimum time loss between operations.

(b) Individual units in the line are designed for the material to be heated and are conservatively rated.

2. LOW OPERATING COST:

(a) Continuous mechanical movement of materials eliminates intermediate handling crews.

(b) Centralized operating control makes it unnecessary to have operators and helpers for individual units.

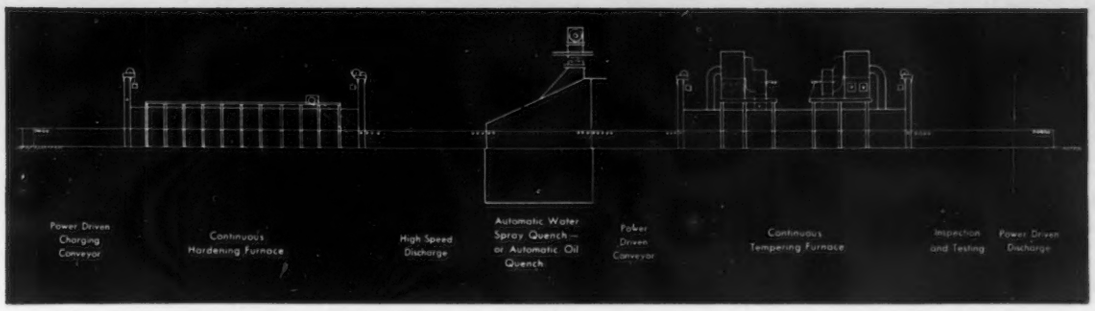
(c) Production rates are consistently high.

3. UNIFORMLY HIGH QUALITY OF TREATED MATERIAL:

(a) Each piece of material is subjected to the same treatment.

(b) The human element is reduced to a minimum.

FURNACE LINES...



(Inspection and checking can be a part of the continuous production line.)

4. MAXIMUM PRODUCTION PER SQUARE FOOT OF SPACE:

(a) The need for storage and manual transfer areas between successive operations is eliminated.

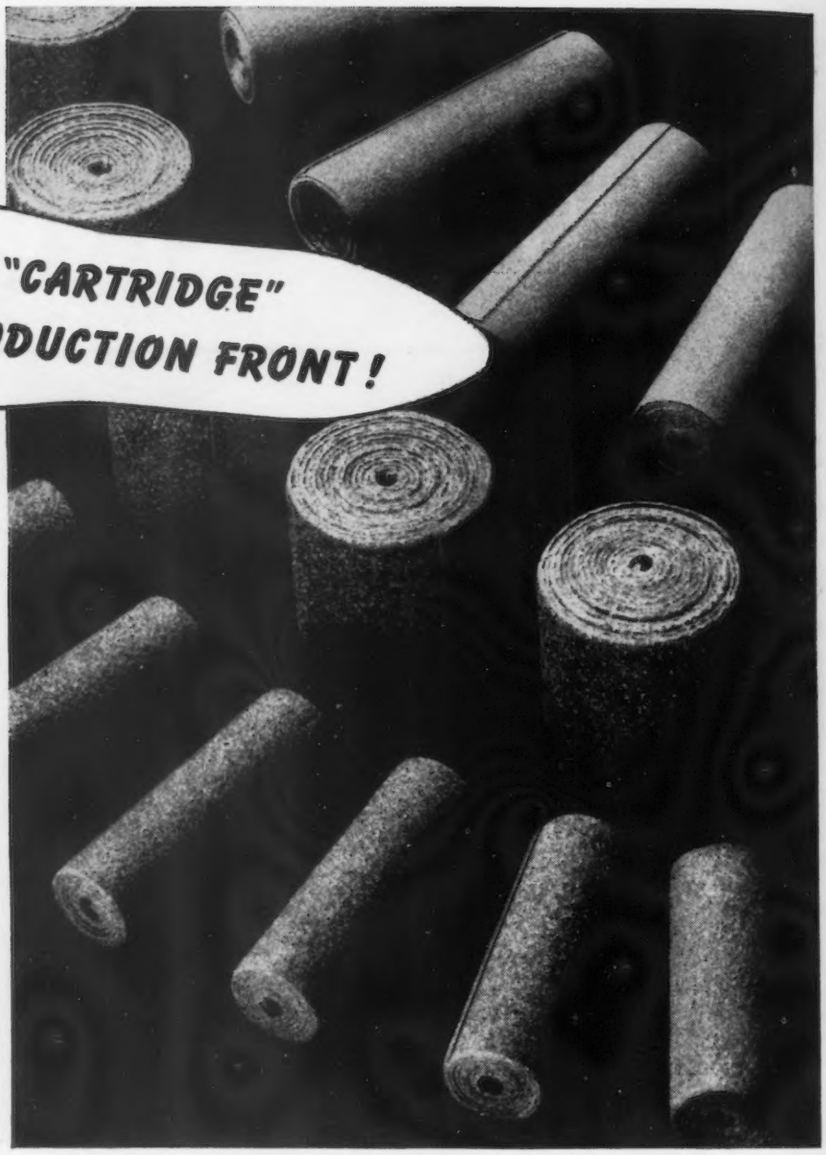
5. ADAPTABILITY:

(a) Proper choice of conveying means and correct relation of units permit handling of a wide variety of parts and materials.

The design shown is a Roller Hearth type for heat treating plate. Capacity can be made to suit requirements.

THE DREVER CO.
780 E. VENANGO ST.
PHILADELPHIA, PA.

A NEW TYPE OF "CARTRIDGE" FOR THE PRODUCTION FRONT!



NEVER before has the metal working industry been called upon to grind, finish or polish such a bewildering variety of parts, fittings and finished products. And never before has there been such a demand for improved metal finishing techniques.

To supply this demand and enable users to keep pace with war production demands, The Carborundum Company has developed many new and novel coated abrasive devices — Weapons for Production, which make possible faster production at lower cost.

One of the most interesting of these is the cloth cartridge roll for finishing otherwise hard-to-get-at surfaces. It is simply a tightly wound glued strip of metal working cloth. The center bore formed by the winding is easily pressed onto a spindle of suitable diameter and length. It is then ready to use on a flexible shaft, air or electric tool.

Sizes range from ⅜" to 1" in diameter and 1" to 3" in length. Grit sizes range from 24 to 320.

These rolls have been found exceptionally effective in finishing, cleaning or polishing out-of-the-way surfaces that are hard to reach, yet must be finished.

The cartridge roll operates much like a mounted abrasive wheel but has the added advantage of being somewhat resilient. It is also economical and long-lived. As the abrasive surface wears down the cloth backing can be unwound and torn off to expose a fresh layer of abrasive.

If you care to see and feel and try one of these cartridge rolls we will be glad to send you one free of charge. Simply address your request to Dept. 1, The Carborundum Company, Niagara Falls, N. Y.

CARBORUNDUM
Reg. U. S. Pat. Off.
ABRASIVE PRODUCTS

THE CARBORUNDUM COMPANY, NIAGARA FALLS, N. Y.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum is a registered trade-mark of and indicates manufacture by The Carborundum Company)

"Torrid", the Despatch Heat Wizard, Speaks to Metal Congress . . .

Despatch Heat Wizard Wins Metal Show O.K.

Reveals Secrets of Successful Despatch Furnaces, Ovens

Cleveland Auditorium, Oct. 12—A fiery, energetic little heat wizard belonging to Despatch Oven Company today told Metal Show delegates new facts about Despatch furnaces.

Striding carefully back and forth on a heavy asbestos platform, the impudent, sizzling little scamp won applause from the audience.

Balanced Heaters, Fans, Ducts

"You've wondered", he said, "how Despatch furnaces and ovens manage to have so much oomph. How it is that they are so flexible and speedy—how overshoot and temperature lag are eliminated. How they can process with such exceptional uniformity and operate so efficiently and economically".

He paused, smiled as closer members of his audience removed their coats, fanned themselves.

"Well, the answer is this: Every single Despatch furnace or oven is engineered. This means that our big, tough, high-velocity fans, our oversized heaters, our adjustable ports in the recirculating duct system are balanced carefully and to the most delicate degree by Despatch engineers who know heat dynamics and can apply their knowledge to fit every furnace or oven because they have had 40 years of practical experience."

Despatch's Complete Line of Furnaces and Ovens

In reviewing Despatch's accomplishments, Torrid laid emphasis on heat treating furnaces for aluminum and magnesium castings, forgings, billets, sheets and shapes for aircraft parts, engine parts, for tanks, etc., furnaces for shell cases that are accomplishing wonders with steel and brass. Also tempering and hardening furnaces, stress relief furnaces and armor plate heat treating furnaces, as well as ovens for speedy and precision core baking, mold drying.

Stop in at the Despatch Booth No. A-415 at the National Metal Congress, and let's get acquainted. I will be flanked by photo murals of Despatch furnaces and ovens where I am now working producing more and better war materials.

After the congress adjourns, you will find me working wherever you see a Despatch foundry oven or furnace.

A special invitation is extended to everyone unable to attend our show this year to call or write Despatch for interesting and helpful bulletins and engineering services.

Torrid

DESPATCH
OVEN COMPANY MINNEAPOLIS

Pentrate

PATENTED
PHYTANIUM BLENDED

The MODERN BLACK FINISH FOR STEEL

Hundreds of thousands of steel items in America's industrial war effort are being finished and protected with Phytanium-Blended Pentrate.

Approved and specified on innumerable blue prints, this durable black finish has released great quantities of strategic metals for other purposes.

The rich deep black appearance, durability, rust resistance and friction reducing qualities of Pentrate achieved immediate acclaim for steel propeller blades, aircraft control bearings, struts, rifles, side arms, machine guns, cartridge magazines, gun mounts, gauges, close assemblies and hundreds of other steel items.

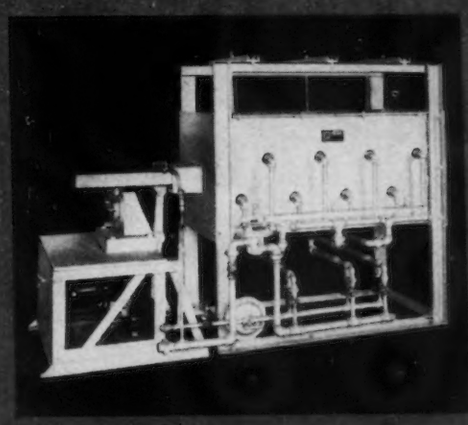
Our new Pentrate catalogue will describe just how this patented, economical, low temperature process can be fitted quickly into your present war production line. WRITE FOR IT TODAY.

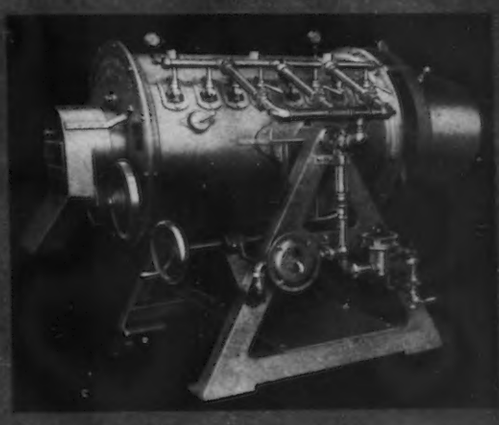
HEATBATH CORPORATION
SPRINGFIELD, MASSACHUSETTS

Canadian Representative, WILLIAM J. MICHAUD CO., Ltd., Montreal

GREATER HEAT TREATING CAPACITY...

can be yours TODAY





...d for full information on the ...ERICAN GAS FURNACE heat... ...g and heat treating equipment.

...st link belt conveyor for nor... ...alizing and hardening a wide ...riety of forgings. Ideal for ...andling rifle and revolver parts ...d similar forgings. Capacity ...to 1500 lbs. per hour.

...s. 176F. Reciprocating Heating ...achine for continuous clean ...ardening with atmosphere con... ...ol. A full muffle is provided ...hrough which work travels. Any ...uired temperature can be car... ...ed; heating time can be adjusted ...suit requirements.

...Rotary Retort Continuous Heat... ...g Machine assures uniform heat... ...g of all work. The retort re... ...ains in the furnace at all times ...d provides the means for heat ...ating in protective atmosphere.

Heat treating requirements on War contracts are calling for better work and more of it in shorter time.

All of which means that furnaces and burners must be modern, heat quickly and efficiently and assure maximum savings in time, money and labor.

AMERICAN GAS FURNACES meet these urgent needs. Built in a complete line, they assure clean products, uniformly heat treated, and are available for loads from the smallest to the largest parts. Types include:

FORGES	RECIPROCATING HEATING MACHINES	ROTARY TEMPERING MACHINES
OVEN FURNACES	ROTARY HEATING MACHINES	SPECIAL HEATING MACHINES
HIGH SPEED FURNACES	CONVEYOR HEATING MACHINES	GAS CARBURIZERS
POT FURNACES	OPEN FLAME HEATING MACHINES	TUBE FURNACES
MELTERS		CYLINDRICAL FURNACES

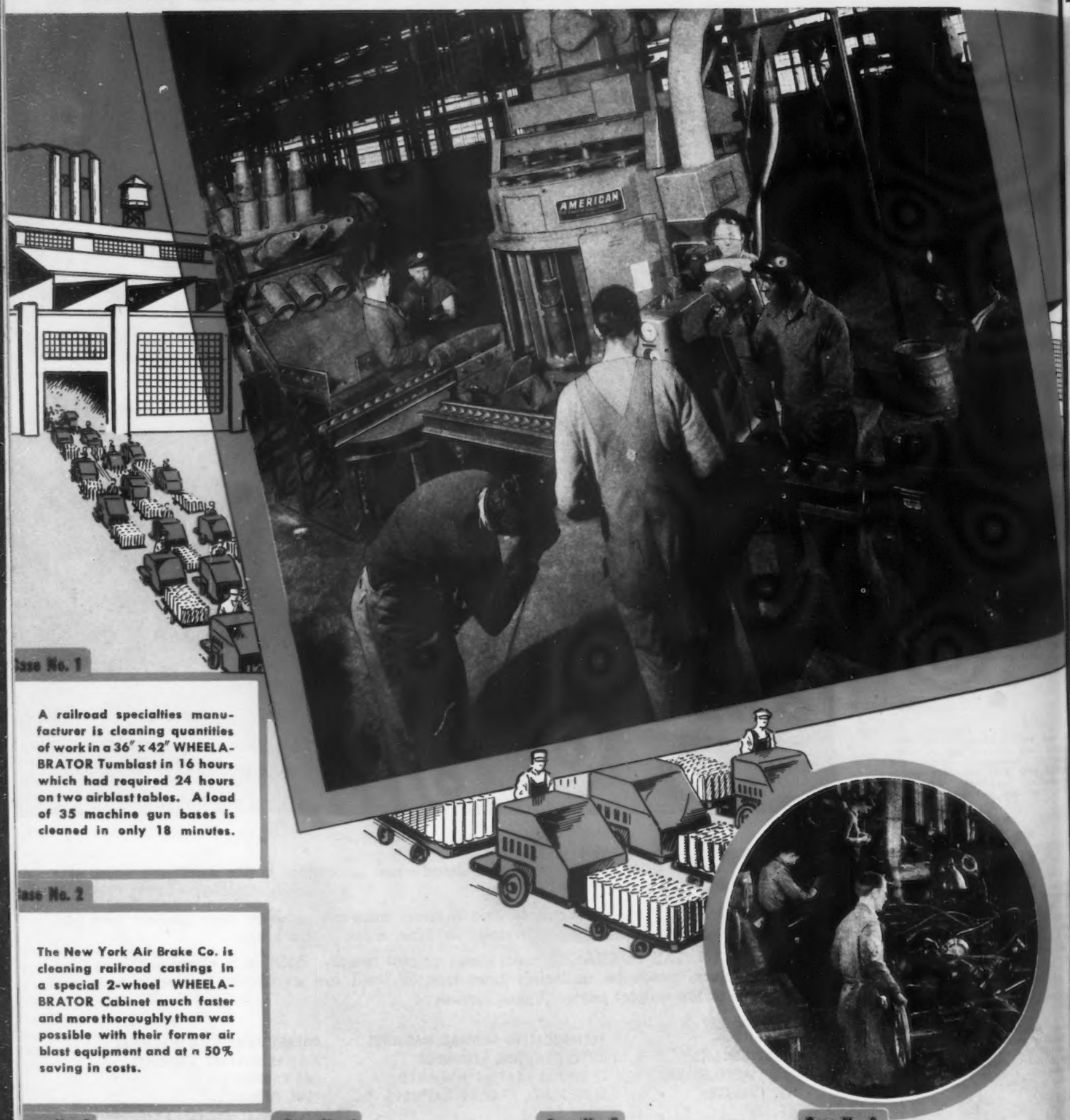
Our engineers and years of experience are at your service.

AMERICAN GAS FURNACE CO.

Elizabeth, New Jersey

AMERICAN GAS FURNACE CO. PIONEERS 1878

WHEELABRATOR



Case No. 1

A railroad specialties manufacturer is cleaning quantities of work in a 36" x 42" WHEELABRATOR Tumblast in 16 hours which had required 24 hours on two airblast tables. A load of 35 machine gun bases is cleaned in only 18 minutes.

Case No. 2

The New York Air Brake Co. is cleaning railroad castings in a special 2-wheel WHEELABRATOR Cabinet much faster and more thoroughly than was possible with their former air blast equipment and at a 50% saving in costs.

Case No. 3

A 48" x 48" WHEELABRATOR Tumblast load of annealed steel fittings and valves is cleaned in less than 30 minutes at Walworth Co., Greensburg, Pa. This amount of work formerly represented 8 hours' cleaning in a sand blast room.

Case No. 4

Brass and bronze castings weighing from 2 to 50 lbs. apiece are cleaned on a WHEELABRATOR Plain Tablast at Reliable Pattern and Castings Co., Cincinnati, Ohio, in one-fifth the time formerly required on an air blast table.

Case No. 5

Time-consuming air blast and tumbling equipment for cleaning brass sprinkler heads were replaced at Rockwood Sprinkler Co., Worcester, Mass., by a 15" x 20" WHEELABRATOR Tumblast which decreased cleaning time 75%.

Case No. 6

A 6' WHEELABRATOR Plain Tablast installed at a Cleveland jobbing foundry speeded up shipments of castings to war production customers, increased storage space and enabled them to organize their cleaning room more efficiently.

TIME FIGHTERS

PUT WORK IN PRODUCTION SOONER BY GIVING YOU *FASTER* CLEAN-UPS

PRODUCTS that "miss the boat" by not being cleaned on schedule never win production battles any more than triple hits that die on third base ever win a ball game. They are just "good intentions" that misfired.

The time to improve "too little and too late" conditions is NOW. If the flow of work through your cleaning room is invariably stalled; if your costs are high and cleaning quality is not what it should be, there is a pleasant surprise in store for you the first time you have a demonstration of the Wheelabrator on your work.

You will see that it is startlingly fast; that it produces a thorough, brilliantly cleaned job; and by simple computation you will prove to your own satisfaction that it will save money in many ways.

Whatever your cleaning problem may be bring it to AMERICAN—world's largest builders of airless abrasive blasting equipment. Our engineers have an unusually wide experience to draw from, because Wheelabrators are used in nearly 2000 plants on practically every conceivable cleaning application.

WHEELABRATOR ADVANTAGES

1. High-speed cleaning
2. Low cleaning cost
3. Reduces horsepower
4. Conserves space
5. Reduces breakage
6. Speeds up machining and grinding
7. Lengthens tool life
8. Simplifies inspection
9. Improves appearance
10. Provides perfect bond for final finishing
11. Insures accurate hardness tests

REG. U. S. PAT. OFF.

AMERICAN FOUNDRY EQUIPMENT CO.

Blast Cleaning and Dust Control Engineers

516 SOUTH BYRKIT STREET • MISHAWAKA, INDIANA

OVER 5000 POUNDS OF
...IN ONE PLANT WITH
ANOTHER WALLOP FOR THE AXIS!

ZINC A WEEK SAVED...
PENNSALT CLEANER

EVERY POUND of essential metal saved is a blow against the enemy. Pennsalt Cleaners are doing forthright service in many industries, helping to conserve vital time and materials by faster, better metal cleaning—at lower cost.

Saving zinc by the proper removal of oil, grease and other soils from structural steel before galvanizing is an example. In one large fabricating plant rejects after galvanizing ran 20 to 25 per cent before Pennsalt Cleaners were introduced.

Now for the Pennsalt method:—Crates of steel parts are lowered by crane into a tank containing a steam-heated solution of Pennsalt Cleaner. After ten minutes they are taken to a rinse tank, then as they are removed they are water-sprayed. Pickling, rinsing, fluxing and coating operations proceed as before.

Result? Virtually *no* rejects! Average daily production up 20 per cent! And the zinc formerly lost due to stripping rejects now is *saved at the rate of over 5000 pounds per 80 hour week!* Over 260,000 extra pounds a year to help win this war. And this saving was made by only *one* manufacturer!

Many leading plants in every field of metal manufacture are saving needed materials and speeding cleaning operations with Pennsalt Cleaners. They are often able to dispense with hand labor and precleaning . . . and so cut cleaning costs.

In a wide range of duties, Pennsalt Cleaners are removing and preventing the redepositing of dirt—grease, oil, emery dust, rouge, carbon smut, grit. The metals and alloys they clean include carbon and alloy steels, stainless steel, copper, aluminum, zinc, nickel, nickel silver, Britannia metal, brass and bronze.

Whether the part is rolled, forged, stamped, drawn or cast . . . Pennsalt Cleaners are producing a remarkably clean, smooth surface that leads to a better job of Bonderizing, Parkerizing, enameling, painting, galvanizing or plating.

In the complete series of Pennsalt Cleaners, there is one which will meet the specific metal cleaning problem in *your* plant. All Pennsalt Cleaners have exceptional dissolving and emulsifying action, extraordinary lasting power and highly efficient cleansing qualities.

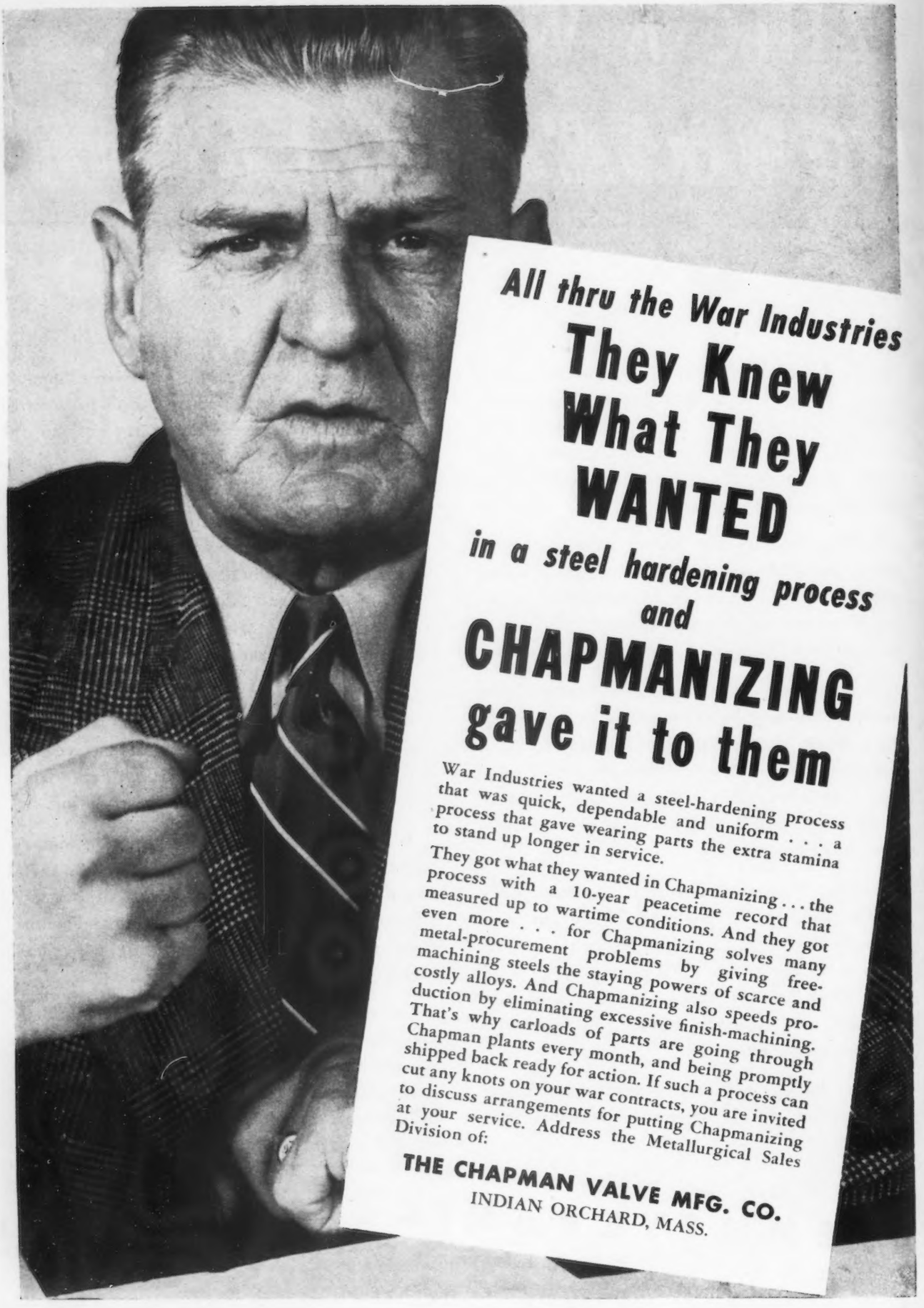
Let one of our experienced technical staff help you choose the Pennsalt Cleaner that will do most to save time, materials and money in your particular metal cleaning operations. Or write fully to our Pennsalt Cleaner Division, Dept. I.

PENNSYLVANIA SALT MANUFACTURING COMPANY

Chemicals

1000 WIDENER BUILDING • PHILADELPHIA, PA.

NEW YORK • CHICAGO • ST. LOUIS • PITTSBURGH • WYANDOTTE • TACOMA



All thru the War Industries

They Knew What They WANTED

in a steel hardening process and

CHAPMANIZING gave it to them

War Industries wanted a steel-hardening process that was quick, dependable and uniform . . . a process that gave wearing parts the extra stamina to stand up longer in service.

They got what they wanted in Chapmanizing . . . the process with a 10-year peacetime record that measured up to wartime conditions. And they got even more . . . for Chapmanizing solves many metal-procurement problems by giving free-machining steels the staying powers of scarce and costly alloys. And Chapmanizing also speeds production by eliminating excessive finish-machining. That's why carloads of parts are going through Chapman plants every month, and being promptly shipped back ready for action. If such a process can cut any knots on your war contracts, you are invited to discuss arrangements for putting Chapmanizing at your service. Address the Metallurgical Sales Division of:

THE CHAPMAN VALVE MFG. CO.
INDIAN ORCHARD, MASS.

Gulf aids to greater war production

GULF CUTTING OILS

are helping war industries get greater production, longer tool life, and better finishes on the work.

GULF QUENCHING OILS

Better physical properties are obtained in many types of steel by quenching in Gulf Super-Quench, new dual-action quenching oil.

GULF QUALITY LUBRICANTS

afford an extra margin of protection to vital equipment, resulting in less down-time and greater production.

GULF PERIODIC CONSULTATION SERVICE

provides both builders and operators of machinery a year-round engineering service on the most approved methods of application for all types of petroleum products.

Gulf quality petroleum products and Gulf Periodic Consultation Service are proven aids to greater war production—proven by outstanding results in plants manufacturing all types of war equipment and materiel.

If *you* have a production or maintenance problem which can possibly be solved by the use of the proper petroleum product, let Gulf's diversified experience and manufacturing technique go to work for you. Get in touch today with your nearby Gulf lubrication service engineer. His analysis of your specific problems and engineering recommendations will help you obtain full capacity output from every machine, a minimum of machine stoppages, and other worth-while benefits.

The services of a Gulf engineer—and the Gulf line of petroleum products for every purpose—are available to you through 1200 warehouses located in 30 states from Maine to New Mexico. Write or 'phone your nearest Gulf office today.

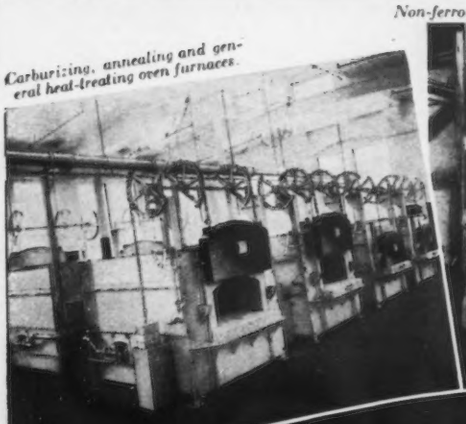
GULF OIL CORPORATION · GULF REFINING COMPANY · PITTSBURGH, PA.

GULF INDUSTRIAL LUBRICATION

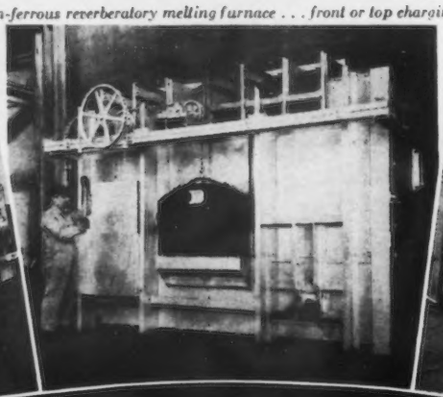
SEE DEMONSTRATION OF GULF SUPER-QUENCH AND GULF CUTTING OILS AT THE METAL SHOW — BOOTH NO. A-329

DEMPSEY
INDUSTRIAL FURNACES

Non-ferrous reverberatory melting furnace . . . front or top charging.



Carburizing, annealing and general heat-treating oven furnaces.



Pot furnace for heat treatment in liquid bath.

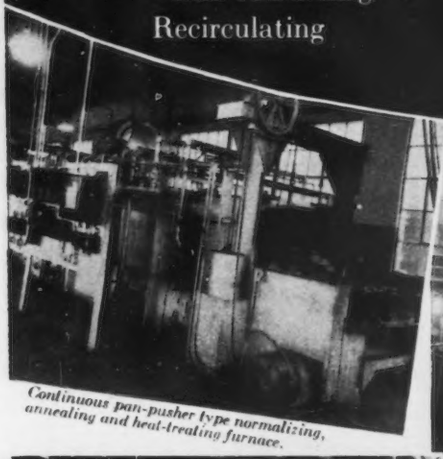
Continuous Conveyor

Bright Annealing
Clean Hardening
Recirculating

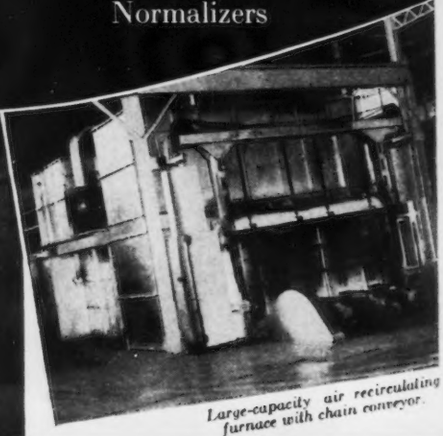
Shell Nosing
Shell Forging
Shell Heat Treating

Billet Heaters
Coil Annealers
Normalizers

Cartridge Case Annealers



Continuous pan-pusher type normalizing, annealing and heat-treating furnace.



Large-capacity air recirculating furnace with chain conveyor.

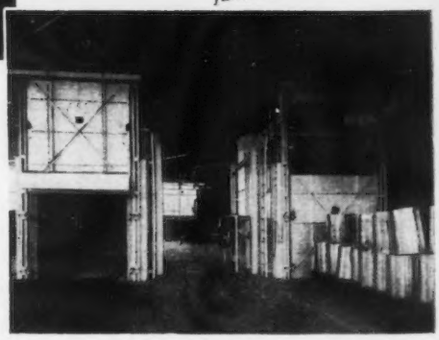
Continuous belt-conveyor type heat-treating furnace.

Over- and under-fired car type annealing, stress relieving and normalizing furnace.

Assure Better Work
Speedier Production
Lower Costs

NEW BULLETINS GIVE COMPLETE DETAILS

Write for them today



Dolly and tray type recirculating furnace.

DEMPSEY INDUSTRIAL FURNACE CORPORATION
SPRINGFIELD, MASSACHUSETTS
FURNACES—OIL & GAS BURNERS
Offers Combined 50 Years' Experience Building:
DEMPSEY FURNACES since 1917 • GILBERT & BARKER since 1908

SPENCER
HARTFORD

Try these simple tests on any

SEE SPENCER AT THE NATIONAL METAL EXPOSITION BOOTH No. E 141

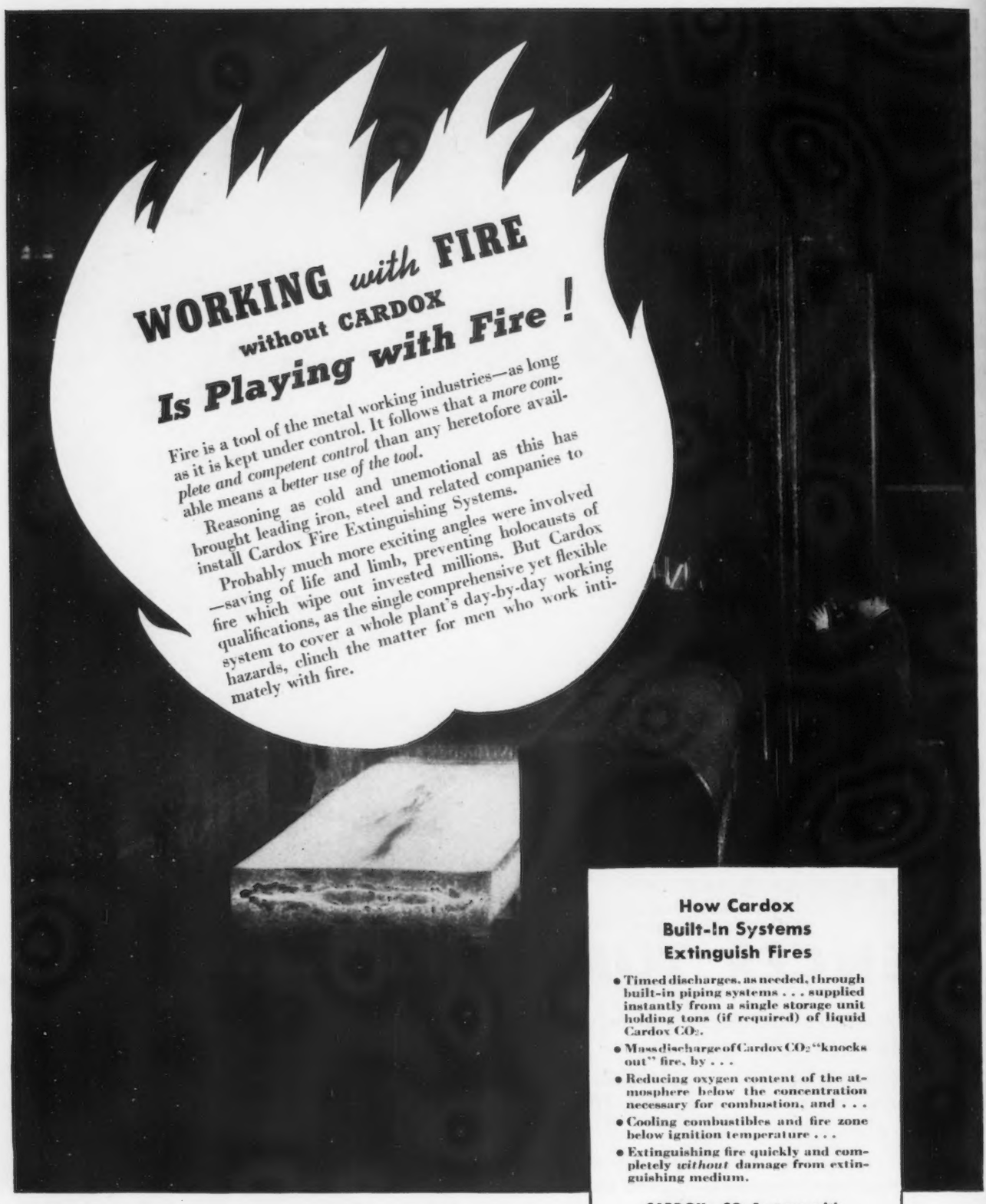
SPENCER TURBO-COMPRESSOR

1. ***Vary the load***—Satisfactory operation without adjusting the blast gate.
2. ***Watch the ammeter.*** Power is used in proportion to the amount of air used. Efficiency is high at all loads.
3. ***Watch the pressure gauge.*** It is constant throughout the range from open to closed.
4. ***Balance a glass*** of water on top of the Turbo. Not even a ripple on the surface of the water!
5. ***Listen*** for mechanical or air noises. It is unusually quiet.
6. ***Examine*** a cross-section view. It is as simple as an electric fan, and built like a bridge.
7. ***Ask any man*** who has used a Spencer for ten or twenty years.
8. ***Ask your furnace*** or oven manufacturer. He is vitally interested in all-round performance.

THE SPENCER TURBINE COMPANY, HARTFORD, CONN.

TURBO-COMPRESSORS

231-S


WORKING with FIRE
without CARDOX
Is Playing with Fire !
Fire is a tool of the metal working industries—as long as it is kept under control. It follows that a more complete and competent control than any heretofore available means a better use of the tool.
Reasoning as cold and unemotional as this has brought leading iron, steel and related companies to install Cardox Fire Extinguishing Systems.
Probably much more exciting angles were involved —saving of life and limb, preventing holocausts of fire which wipe out invested millions. But Cardox qualifications, as the single comprehensive yet flexible system to cover a whole plant's day-by-day working hazards, clinch the matter for men who work intimately with fire.

How Cardox Built-In Systems Extinguish Fires

- Timed discharges, as needed, through built-in piping systems . . . supplied instantly from a single storage unit holding tons (if required) of liquid Cardox CO_2.
- Mass discharge of Cardox CO_2 "knocks out" fire, by . . .
- Reducing oxygen content of the atmosphere below the concentration necessary for combustion, and . . .
- Cooling combustibles and fire zone below ignition temperature . . .
- Extinguishing fire quickly and completely *without* damage from extinguishing medium.

CARDOX—CO_2 Systems with Enhanced Fire Extinguishing Performance

A. Uniformity of CO_2 characteristics.
B. Extinguishing medium with uniformly greater cooling effect.
C. Accurate projection of CO_2 through greater distances.
D. Timed discharges, as needed, through built-in piping systems . . . supplied quickly from a single tank holding tons of liquid Cardox CO_2.

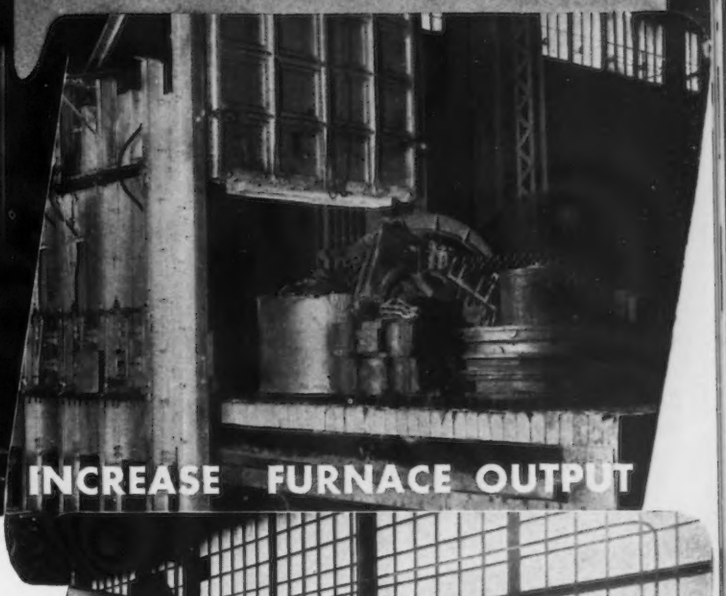
CARDOX

NON-DAMAGING FIRE EXTINGUISHING SYSTEMS

District Offices in: New York • Detroit • Pittsburgh • Cleveland
Kansas City • Atlanta • San Francisco • Los Angeles • Seattle

CARDOX CORPORATION • Bell Building, Chicago

BROWN CONTROLLERS for TREATMENT OF METALS



Quality and *Quantity* are most essential in producing tools of war.

If your plant is confronted with new and intricate temperature control problems in the treatment of metals for Planes, Guns, Tanks, Ships, etc.—you can rely on Brown Controllers to standardize quality and speed-up production.

Throughout the metal working industries, Brown Indicating, Recording and Control Potentiometers are helping skilled and unskilled workers to produce better quality—conserve war materiel—increase furnace output—eliminate rejects and re-treatments.

Whether you heat-treat steel — make die castings — bake enamel or do galvanizing — your war materiel, furnaces, time and money are staked on accurate temperature control.

That is why leading companies are turning to Brown and Minneapolis-Honeywell Control Systems for positive control of temperature processes. They are applicable for any type furnace—oil, gas or electric. You'll find them everywhere, on all makes of furnaces used for every kind of work where precision temperature measurement and control mean low cost furnace operation.

BROWN POTENTIOMETER CONTROLLERS

THE BROWN INSTRUMENT COMPANY, 4483 WAYNE AVENUE, PHILADELPHIA, PENNSYLVANIA

DIVISION OF MINNEAPOLIS-HONEYWELL REGULATOR CO.

MINNEAPOLIS, MINNESOTA, AND 119 PETER STREET, TORONTO, CANADA

Wadsworth Road, Perivale, Middlesex, England

Nybrokajen 7, Stockholm, Sweden

If you must substitute materials . . . keep them presentable with WRINKLE FINISH

➡ Substitution is not an exclusive penalty for civilian products. Instruments of war, as well as goods affecting the war effort, feel its effect and present new problems of design and manufacture. Like as not, a new finish is needed to make the substitute materials presentable in appearance and to protect the surface. That is where WRINKLE FINISH comes in. Coat your substitute material with WRINKLE FINISH as hundreds of manufacturers are doing today. It is the solution to the finishing problem.

LABORATORY SERVICE

For the benefit of manufacturers with finishing problems, NEW WRINKLE maintains a completely equipped laboratory where Industrial Finishing is in the hands of experts who are solving such problems every day. These facilities are at your disposal. Send us a sample of your product to be analyzed.

Victory

SPECIFICATION SHEET

The replacement of critical raw materials with less strategic materials and ingenuity has resulted in furthering the war effort and in the Nation's manufacturers discovering the true merits of NEW WRINKLE—*the one-coat finish.*

ALUMINUM. *Aluminum castings have given way in many instances to cast iron castings and steel forgings, plus a coat of* WRINKLE FINISH, *with the result of decided savings.*

PLASTICS. *To preserve Thermal-resin for the more critical needs of war, plastics with this base are being replaced with cast iron parts.* WRINKLE FINISH *is an asset to the surface in this case.*

STAINLESS STEEL. *The rationing of chromium has created a rationing of stainless steel. Manufacturers who have substituted sheet steel and* WRINKLE FINISH *are much pleased with the results.*

CHROMIUM. *Surfaces which sported chromium are out for the duration.* WRINKLE FINISH *is proving to be a desirable substitute to lend attractiveness to such surfaces where appearance is highly important and protection an advantage.*

METAL vs. WOOD. *Wood can now be made to simulate metal by applying* WRINKLE FINISH, *thus improving customer appeal in many instances.*

Billy Wrinkle says:

YOUR "VICTORY" MODELS WILL BE BETTER WITH WRINKLE

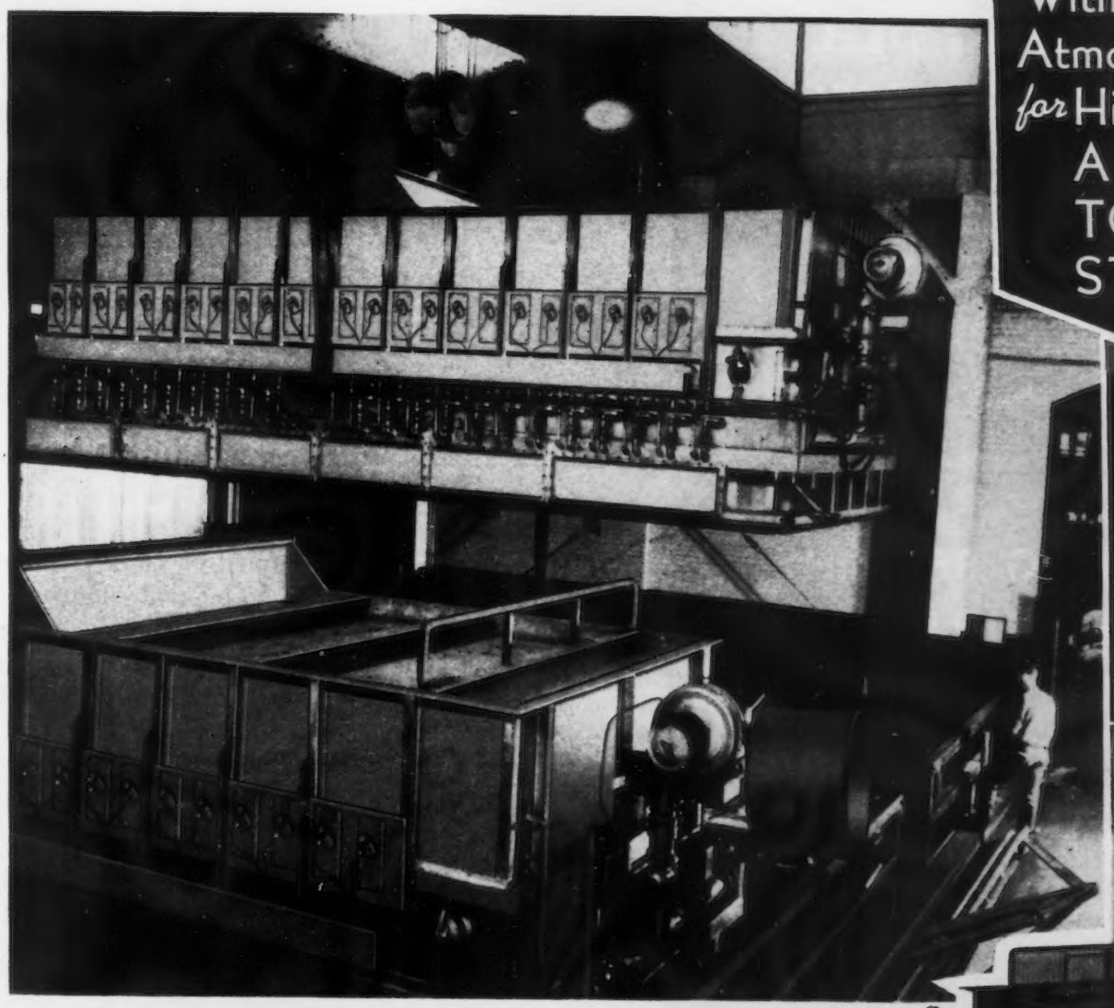
NEW WRINKLE INC.

314 W. FIRST ST. · · · DAYTON, OHIO

Write for the latest issue of "New Wrinkles In Finishing." It will help you materially, with actual suggestions, to solve today's important finishing problems.

RECTANGULAR BELL TYPE FURNACES *for Annealing Treatments of* LONG BARS *and* TUBES, COLD DRAWN *or* HOT ROLLED

With Special Atmospheres *for* Hi-Carbon Alloy *and* TOOL STEELS



These Furnaces Handle BARS 25 ft. Long

Lee Wilson ENGINEERING Co.

20005 West Lake Road CLEVELAND, OHIO

Telephone AC-4670

IN TIMES LIKE THESE *a man needs all the help he can get!*

ARE YOU

DRAWING STEEL CARTRIDGE CASES?	Houghton is working cooperatively with contractors on this new type of case. We can help you in the selection of the best drawing compound to ease the draw.
HEAT TREATING ARMOR-PIERCING SHOT?	Neutral hardening in salt . . . decremental hardening . . . stress relieving—Houghton has products and processing data which will aid in your heat treatment.
DRILLING, REAMING and RIFLING GUN BARRELS?	Houghton is helping makers of small arms and medium caliber guns produce faster and more accurately, by supplying cutting fluids that take plenty of punishment and assure high finish, longer tool life, fewer rejects.
HARDENING HIGH EXPLOSIVE SHELLS?	Lower alloy steels require fast rate of quenching. Houghto-Quench, devised for armament work, answers the quenching problem . . . makes it possible to meet government standards while conserving vital alloys.
RUST-PROOFING BETWEEN OPERATIONS, IN STORAGE OR SHIPPING?	Name your problem; we have the answer, based on seventy years of rust prevention. Every required consistency and type of Houghton's Cosmoline and Rust Veto to meet government and industrial specifications.
CARBURIZING ARMOR PLATE?	Light, medium or heavy plate—we supply carburizing compounds used for most of the case-hardened armor plate now being produced for the war effort.

Do you receive "WAR PRODUCTION DATA from The HOUGHTON LINE?" It tells more about the above and related metal processing. It's free.

E. F. HOUGHTON & CO.

Oils, Leathers and Metal Working Products

PHILADELPHIA

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ROCKWELL FURNACES

Doing a Big Job for

Uncle Sam

SHELLS, GUNS AND AMMUNITION OF ALL CALIBERS

BRASS FOR AMMUNITION AND WIRE FOR THE SIGNAL CORPS

PLATE, ANGLE AND FORGE FURNACES FOR SHIPYARDS

RECENT Rockwell Furnace designs incorporate the latest developments in automatic controls, conveying and handling mechanisms. Rockwell engineers, backed up by an organization that has been building industrial furnaces continuously for over fifty years are responsible for this highly refined furnace equipment. The result has been furnaces that deliver work of higher quality at greatly increased production rates.

We will be glad to make recommendations for speeding up your heat treatment production.

AIRPLANE PARTS

AERIAL BOMBS

Many Rockwell Furnaces are now being built without plates. They can be more quickly and economically produced, saving plates for the shipbuilding program.

W. S. ROCKWELL CO.

ROCKWELL SINCE 1888 BUILT

50 CHURCH ST., NEW YORK

MANUFACTURERS OF ELECTRIC AND FUEL FIRED INDUSTRIAL FURNACES

A Sign of RELIABLE Heat-Treating SERVICE

R-S

QUALITY PRODUCTS SINCE 1908

Soft Metal Melting for Stamping Dies Used in the Aircraft Industry. Also Salt Baths for Heat-Treating Dural.

Close Temperature Uniformity is Obtained in this Convection Car Type Furnace. Direct Mounted Electric Car Drive for Smooth Operation with Safety.

Top and Bottom Gas Fired Stress Relieving Furnace with a Capacity of Eighty Tons Per Charge.

Box Type Furnace for the Miscellaneous Heat Treatment of Small Parts.

This R-S name plate on an industrial heat-treating furnace is more than a means of identification—it is the stamp of approval of R-S Engineers.

It guarantees top notch production due to proper design, erection and operation.

It guarantees that the entire equipment is geared to individual plant conditions and the type of heat-treated product involved.

It assures minimum fuel consumption and the conservation of manual effort with maximum safety.

For heat-treating efficiency and economy, today or tomorrow, specify R-S Industrial Furnaces. Note the illustrations of modern installations.

If you have an industrial heat-treating problem, write on your company letterhead for helpful suggestions.

FURNACE DIVISION

R-S PRODUCTS CORPORATION

4524 Germantown Ave., Philadelphia, Pa.

R-S Furnaces of Distinction

BUY WAR BONDS

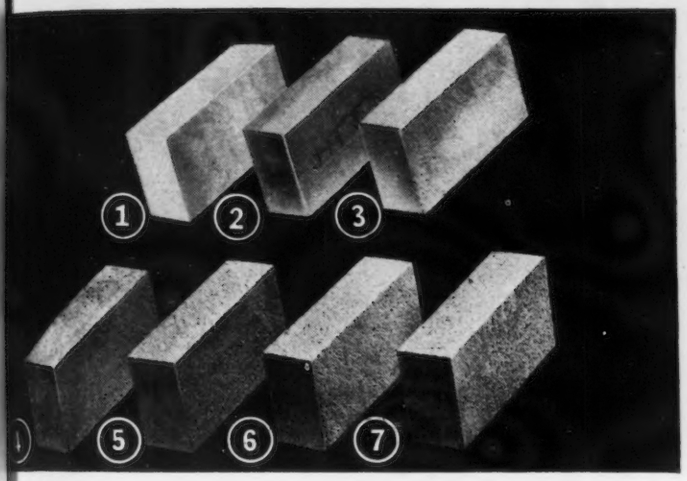
For the

BIG INSULATING JOBS

In the Iron and Steel Industry...

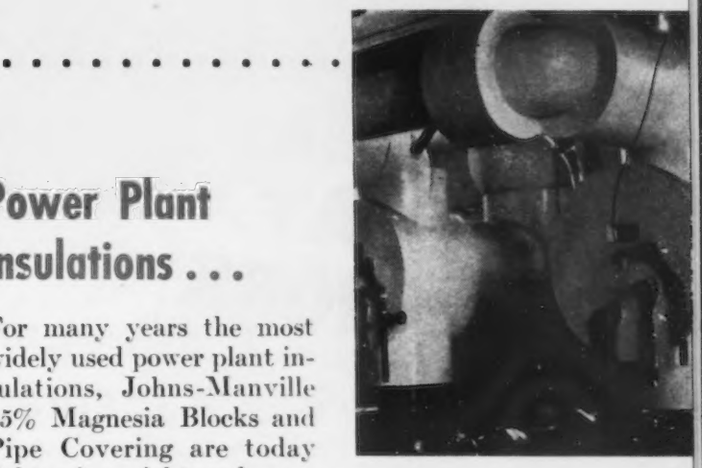
Lastingly Efficient Block Insulation...

J-M Superex meets every steel-mill requirement for temperatures to 1900° F. Combines high heat resistance and great durability with exceptional insulating value. Standard sizes 3″x18″, 6″x36″ and 12″x36″; from 1″ to 4″ thick. Other sizes and thicknesses on order. J-M 85% Magnesia or Asbesto-Sponge Felted are often used outside of Superex, which construction is known as J-M Superex Combination Insulation.



Seven Types of Brick...

Three types of insulating brick: (1) Sil-O-Cel Natural Brick for temperatures to 1600° F.; (2) Sil-O-Cel C-22 Brick for temperatures to 2000° F.; (3) Sil-O-Cel Super Insulating Brick for temperatures to 2500° F. Four types of insulating firebrick—(4) JM-16 for temperatures to 1600° F.; (5) JM-20 for temperatures to 2000° F.; (6) JM-23 for temperatures to 2300° F.; (7) JM-26 for temperatures to 2600° F. All provide light weight, low cost, low conductivity. Furnished accurately sized in all standard sizes of the 2½″ and 3″ series, as well as in specials.



Power Plant Insulations...

For many years the most widely used power plant insulations, Johns-Manville 85% Magnesia Blocks and Pipe Covering are today lighter in weight and more efficient than ever before. Standard-size blocks are 3″x18″, 6″x36″ and 12″x36″; from 1″ to 4″ thick. Other sizes, including lagging, furnished on special order. Pipe insulation is available in 3-foot lengths in thicknesses up to 3″. For temperatures above 600° F., Superex Combination Block or Pipe Insulation is recommended—an inner layer of high-temperature Superex and an outer layer of 85% Magnesia. Sizes same as those of 85% Magnesia.

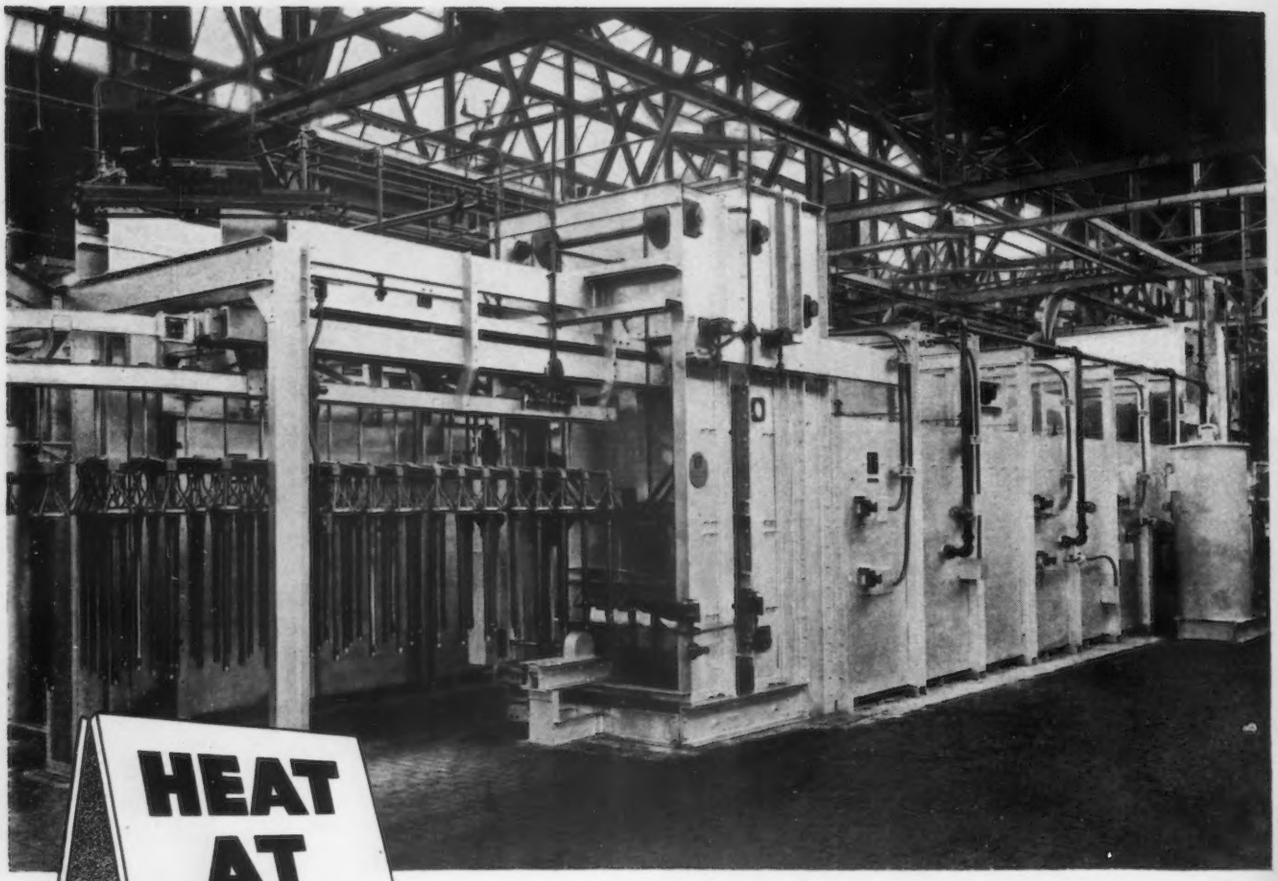
Semi-Refractory Insulating Concrete...

Sil-O-Cel C-3 Concrete is the ideal material for lining furnace doors and for insulating furnace bases. Weighs less than half as much as firebrick; has 3 times greater insulating value. Cast on the job from Sil-O-Cel C-3 aggregate and cement. Sets up into a strong, durable concrete for temperatures up to 1800° F. Furnished in 100-lb. bags.

THESE ARE BUT A FEW of the many Johns-Manville Insulations that are helping assure dependable, uninterrupted operation of all types of heated equipment in the iron and steel industry. For details on all J-M Insulations, write for Catalog GI-6A. Johns-Manville, 22 East 40th Street, New York, N. Y.

Johns-Manville

INDUSTRIAL INSULATIONS



HEAT AT WORK

. . . and at maximum efficiency with Armstrong's Insulating Fire Brick on the job!

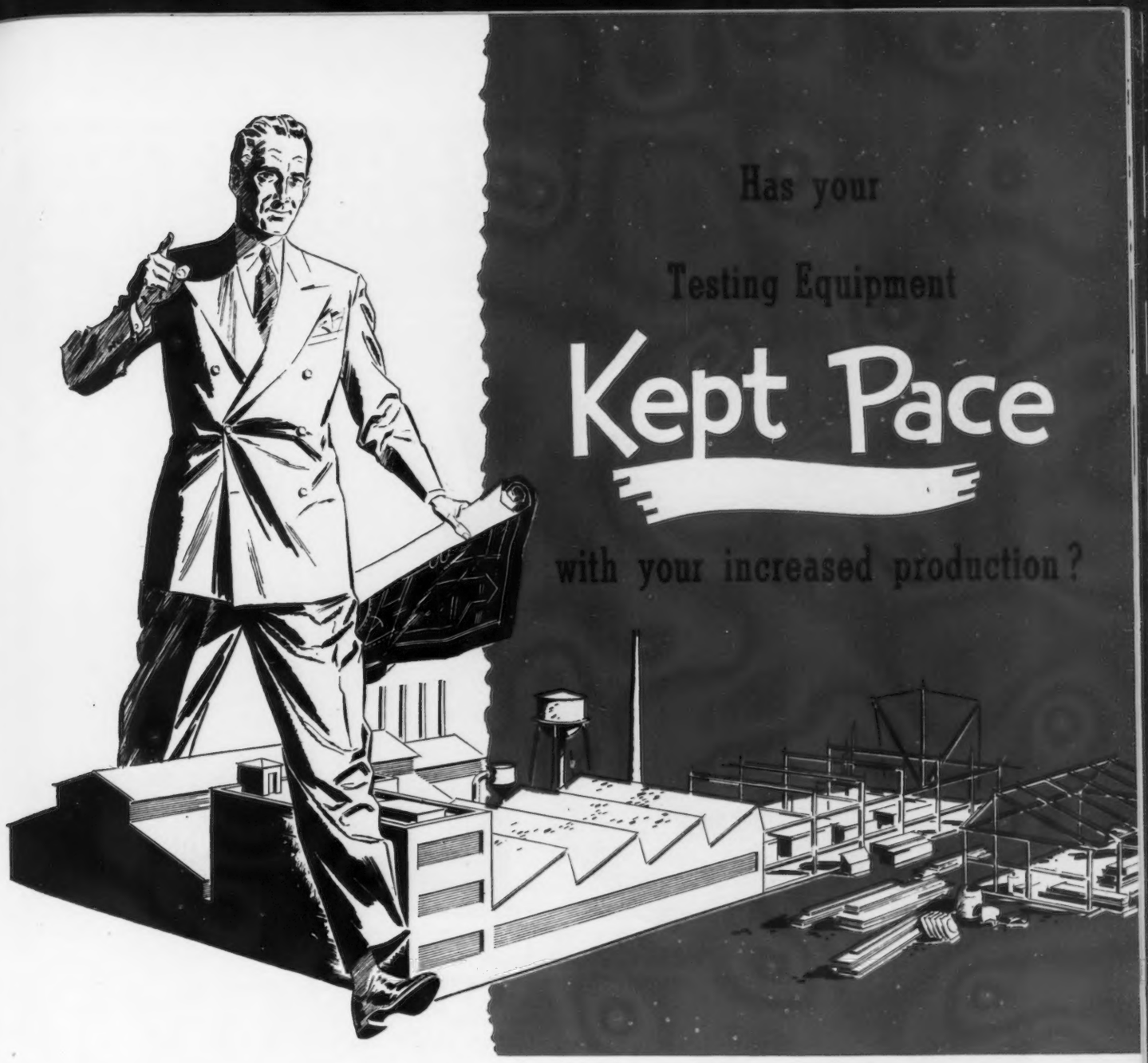
FURNACES lined with Armstrong's Lightweight Refractories are furnaces ready for peak production. These efficient insulating fire brick are made to keep heat under control . . . to cut *time* and *cost* per ton of finished product!

Yes, all five types of Armstrong's Insulating Fire Brick (designed for use at temperature maximums from 1600° F. to 2600° F.) have a mighty important place in today's all-out production picture. Their high insulating efficiency helps hold temperatures in the narrow ranges needed to assure top product quality. And it also plays an important part in conserving fuel.

These lightweight brick have low heat storage which speeds heating and cooling and permits faster cycles in intermittent operation. Their physical strength and spalling resistance, their uniformity, low shrinkage, and ample refractoriness, all help them stay on the job longer —help keep time-out for repairs and replacements at a minimum.

Armstrong's engineers will be glad to help you choose the right brick, the right cement, and the best method of application for your equipment. Get full facts now. Write to Armstrong Cork Company, Insulating Refractories Dept., 978 Concord Street, Lancaster, Penna.

See the Armstrong Exhibit at the STEEL SHOW Space No. D-138



In building our war machine, there must be no sacrifice of quality for speed. America must have not only the most, but also the best that its industries can produce. The physical properties of materials must be known by both producer and fabricator alike—specifications must be met, there can be no compromise.

It's easy to run fast, accurate tests on a recorder-equipped Southwark-Tate-Emery testing machine. A continuous-line stress-strain curve is plotted simultaneously with each test and complete tests, including records, can be made in as little as four minutes on routine work.

A wide variety of physical testing machines and instruments for both static and dynamic strain measurement and stress analysis is available from Baldwin Southwark in addition to the universal machine.

A complete listing and brief description of our equipment is available in Bulletin K-107. Write for your copy today.

BALDWIN

Southwark

BLW THE BALDWIN GROUP

DIVISION OF THE BALDWIN LOCOMOTIVE WORKS • PHILADELPHIA

SERVICE is my middle name

WYANDOTTE *Service* Representative is the name, and now more than ever the emphasis is on the service.

Service to you in your big job of serving the nation. Service any time night and day. Service at once, when you need it, and as long as you need it.

Wyandotte Service Representatives are trained metal-cleaning experts. They work in war production plants and arsenals the country over, and they are constantly bumping into and pushing over all kinds of metal cleaning and finishing problems, old and new, large and small.

Whether you are cleaning ammunition, plane or tank parts — whatever your degreasing problem may be — there's a Wyandotte man at your shoulder, ready to help you do the job . . . ready to do it right and right away!

Visit the Wyandotte Booth at the National Metal Exposition

Wyandotte
PRODUCTS
SERVICE REPRESENTATIVES IN 88 CITIES

THE J. B. FORD SALES COMPANY • WYANDOTTE, MICHIGAN

MEMORABLE WORDS OF GREAT AMERICANS

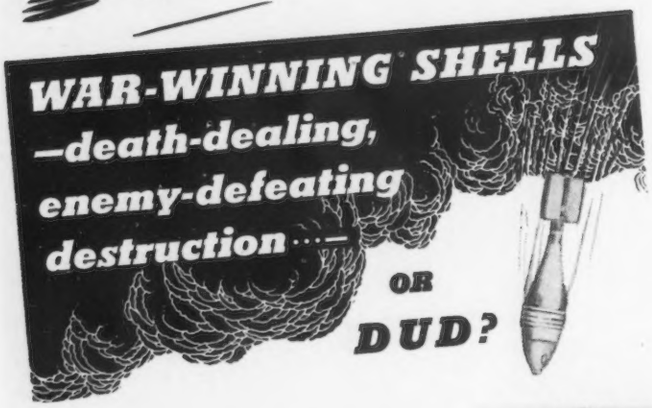
DANIEL WEBSTER

"God grants liberty only to those who love it and are always ready to guard and defend it. Let our object be our country. And, by the blessing of God, may that country itself become a vast and splendid monument, not of oppression and terror, but of wisdom, of peace, and of liberty".

Daniel Webster—Illustrious Defender of the Constitution, through his great statesmanship, fought to keep this country a united people.

THERMALLOY *the "EYE" of QUALITY*
THE ELECTRO ALLOYS COMPANY
CASTINGS FOR HEAT CORROSION
ELYRIA, OHIO
QUALITY CASTINGS SINCE 1919

Now ...— the need is for SPEED DUTS!



A PHILLIPS DEGREASER WILL SPEED UP YOUR OUTPUT OF METAL PARTS, SHELLS . . .

and cut costs!

The Phillips Portable Degreaser removes oils and grease from all metals simply, economically. It saves labor by allowing you to

"Take degreasers to the work instead of work to the degreaser."

Self-contained, electrically heated and controlled, provides for recovery of solvent by built-in distillation equipment. Just plug in and go to work . . . no installation, no steam, water, gas connections. Capacities up to a ton an hour.

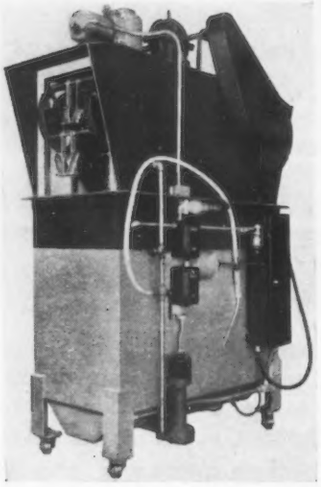
Write for Catolog.

IT CAN DEPEND ON PROPER DEGREASING

DUDS DON'T DEMOLISH! . . . and duds can be caused by the interior of the shell not being 100% free from oil and grease before the protective lacquer is sprayed onto its interior.

The Phillips Automatic Shell Degreaser individually cleans shell interiors by spraying Phillsolv, the perfect degreasing solvent, into cavities UNDER PRESSURE!

Available for cleaning 20 MM to 155 MM shells . . . capable of handling from 100 to 5,000 per hour. Write for bulletins.



Manually operated models in stock sizes from 14" x 14" to 60" x 108".

SPACE C-327

NATIONAL METAL EXPOSITION

PHILLIPS MANUFACTURING CO.

3471 WEST TOUHY AVE., NORTHTOWN STATION, CHICAGO, ILL.

Distributors in Principal Cities Throughout the U. S.

HOLDEN RESEARCH

☆☆ *Offers* TWO *NEW* HEAT TREATING BATHS ☆☆

OF PROVEN MERIT

ONE part is hardened, the other is unhardened. No difference can be detected in their appearance.

(BELOW)
FORGINGS before and after hardening, descaling and bright tempering.

1 BRIGHT TEMPER

(Operating range 750°-1100° F.)

Steel parts hardened in salt bath retain their original metallic surface, free of scale. However, when tempered in air or nitrate baths, the surface oxidizes, producing scale or temper colors.

Bright Temper bath may be used to temper such parts, retaining their original surface appearance without any film of oxide or temper colors.

There is no necessity for sandblasting, pickling, or other treatments to obtain a clean surface on parts tempered in this bath. This saves time on subsequent grinding or finishing operations.

2 CLEAR QUENCH

Steel parts annealed or hardened in muffle furnaces with scale varying in thickness from .001" to .005" may be treated in Clear Quench for a few minutes and remove all the scale, thus producing a clean, metallic surface.

Forgings with heavy scale may be directly quenched into this bath after forging operation is completed, thus removing all the scale. Clear Quench often is so effective that it eliminates the sandblasting operation, with the consequent saving in time and labor. On delicate parts which cannot be safely sandblasted, this bath offers an ideal means of removing scale and soot.

These two new baths, Bright Temper and Clear Quench are used today in many plants, producing, at a saving, better surface conditions on steel parts and tools on many aeroplane parts.

All the Holden products, baths as well as furnace equipment are proven in production and are backed with engineering service plus undivided responsibility and guaranteed performance.

NO OXIDATION NO SCALE AT ANY TEMPERATURE

THE A. F. HOLDEN COMPANY
NEW HAVEN, CONN.

Chemical and Furnace Division, 52 Richard St., West Haven, Conn.

Commercial Heat Treating Division, 200 Winchester Ave., New Haven, Conn.

Manufactured in Canada by Peacock Bros., Ltd., Montreal, Quebec

BASE METALS BEHAVE LIKE NOBLE METAL in HOLDEN BATHS

3 *NEW* BULLETINS *Containing*
information on the latest Heat Treating Practice
Holden Furnaces, Liquid Carburizing Baths, Hy-Speed Case.
Available at BOOTH B147 Cleveland Metal Show or write.

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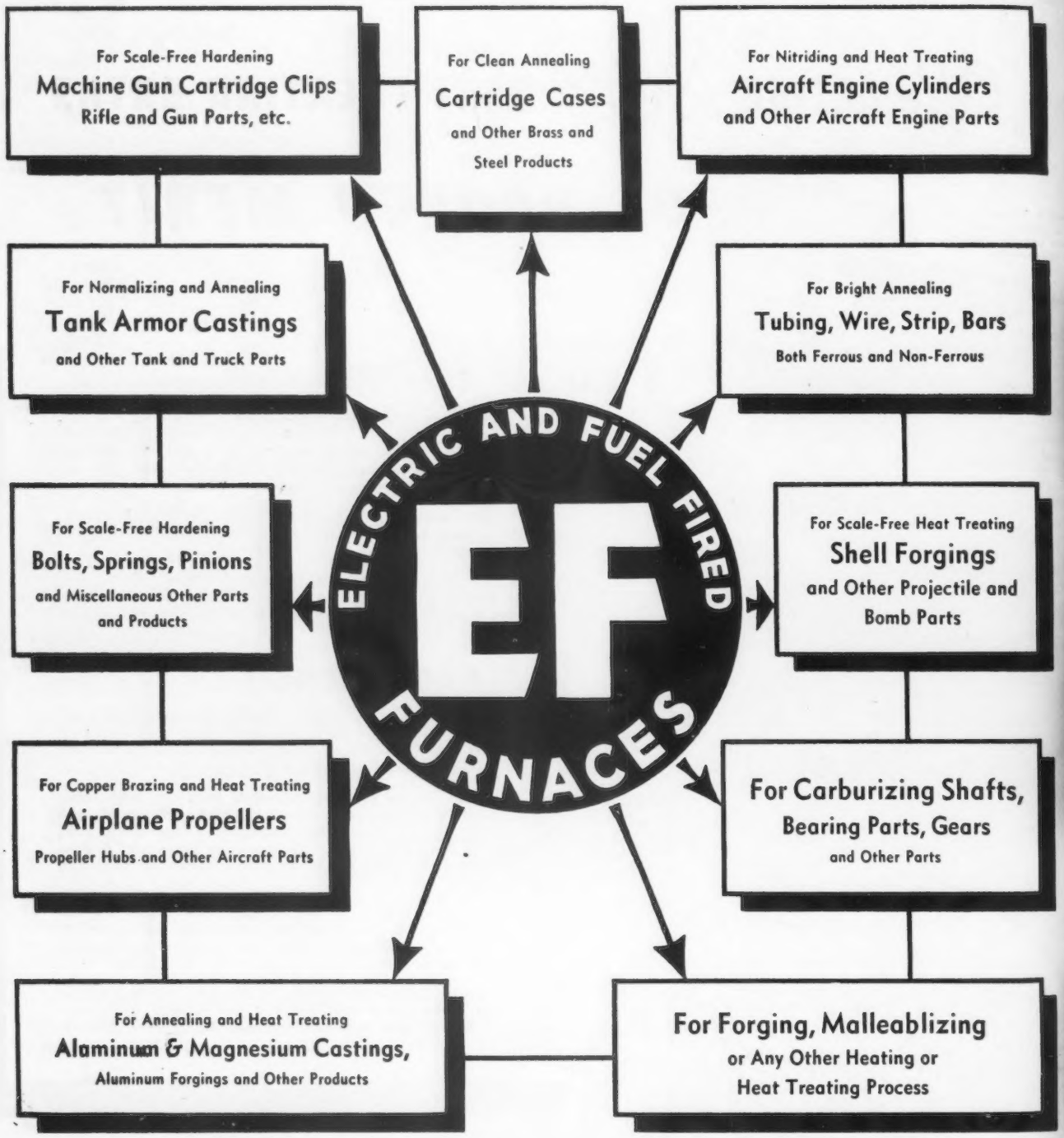


Increased production and uniformity; the saving of valuable time, labor and metals and other advantages have been effected by recent EF continuous automatic, semi-continuous and batch type furnace installations.

The Electric Furnace Co. specializes in designing and building production furnaces and time and labor saving material handling equipment. Years of practical furnace building experience have enabled EF engineers to develop some outstanding production furnaces for handling the above materials and many other essential war products.

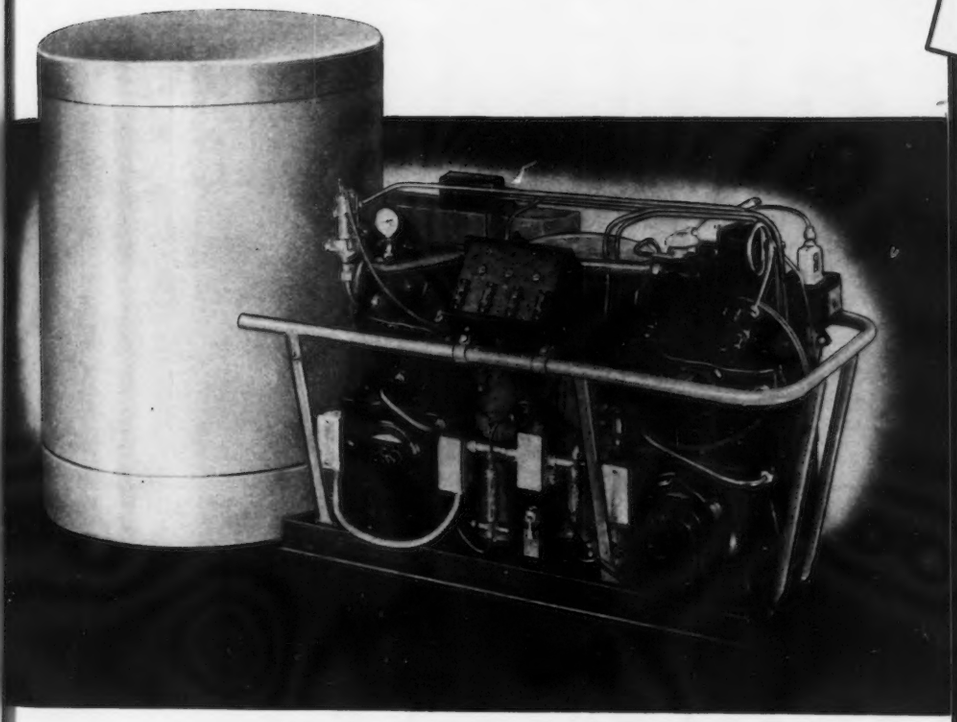
Submit *your* production furnace problems to EF engineers.

The Electric Furnace Co., Salem, Ohio

Gas Fired, Oil Fired and Electric Furnaces---For Any Process, Product or Production

Deepfreeze Metal Chilling serves you three different ways... effects savings up to $2825 per year over dry ice... removes 1000 B. T. U.'s per hour at —120° F.

SEE HOW IT'S DONE AT THE METAL SHOW
Visit our booth at the National Metal Exposition at Cleveland, October 12 through 16. Consult with our engineers—find how Deepfreeze can serve you in your present and future work.



THE DEEPFREEZE SANTOCEL CASCADE INDUSTRIAL CHILLING UNIT has a chilling chamber 24" in diameter x 30" deep —over 31 square feet of primary freezing surface. It is equipped with two motors and two compressors of the open silent-valve head, water-cooled, piston type. It has a heat absorbing capacity equivalent to 5¾ lbs. of dry ice per hour at same temperature and under similar operating conditions.

The same standard unit can be furnished 60" deep, or deeper.

Special units can be furnished to suit specific applications. For instance:

A prominent aircraft manufacturer has been furnished with a special Deepfreeze Unit capable of producing a vacuum condition similar to that found at maximum flying altitude. It is provided with a transparent top and is used for testing flying instruments.

Another aircraft producer has been supplied with an extra deep unit for shrinking landing gear parts in assembly.

A blood plasma manufacturer uses a special Deepfreeze Unit for desiccating blood plasma. These are but a few of the many applications of Deepfreeze. It will serve you as well.

$2825 SAVINGS OVER DRY ICE!

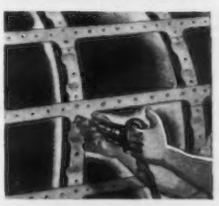
Laboratory tests prove that the cost for removing 1000 B.t.u.'s per 24-hour day over a period of one year with dry ice will cost $3000.00, as against the $175.00 electric current consumption of the Deepfreeze over the same period of time.

Metal working industries' newest helper—the Deepfreeze Cascade Industrial Unit is saving time and money in practically every type of metal working plant in the country. It can also serve you in any one, or all three, of the following ways:

1 Shrinking of metal at *—100° F. to —120° F.* has made it possible to assemble bearings and similar parts requiring a press-fit, by merely slipping them into position...eliminates spoilage caused by "pounding" bearings into place...saves time caused by delay in replacing bearings...saves cost of expensive equipment.

Another application is in chilling aluminum alloy rivets 17S-T and 24S-T to retard aging. Rivets can be kept soft enough for driving for a period of over two weeks.

2 Testing of metals at *—100° F. to —120° F.* has made it possible to study the reactions of aircraft instruments to stratosphere flying. Aircraft engine lubricants can also be pretested for sub-zero flying. Tests are usually conducted over a 6 or 8 hour freezing period.



3 Treating of metal at *—100° F. to —120° F.* will produce combinations of hardness, strength and ductility not obtainable by ordinary hardening or tempering. For treatment of high-speed steel, temperatures colder than —150° F. are ineffective. Temperatures *warmer* than —100° F. are also ineffective. The Deepfreeze Cascade Unit is capable of maintaining —120° F., making it ideal for the proper treatment of high-speed steel.

DEEPFREEZE DIVISION
MOTOR PRODUCTS CORPORATION
2328 DAVIS ST., NORTH CHICAGO, ILLINOIS

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and proof of the outstanding success of the Deepfre method for chilling metals is included in this book! Write for your copy today. Address...

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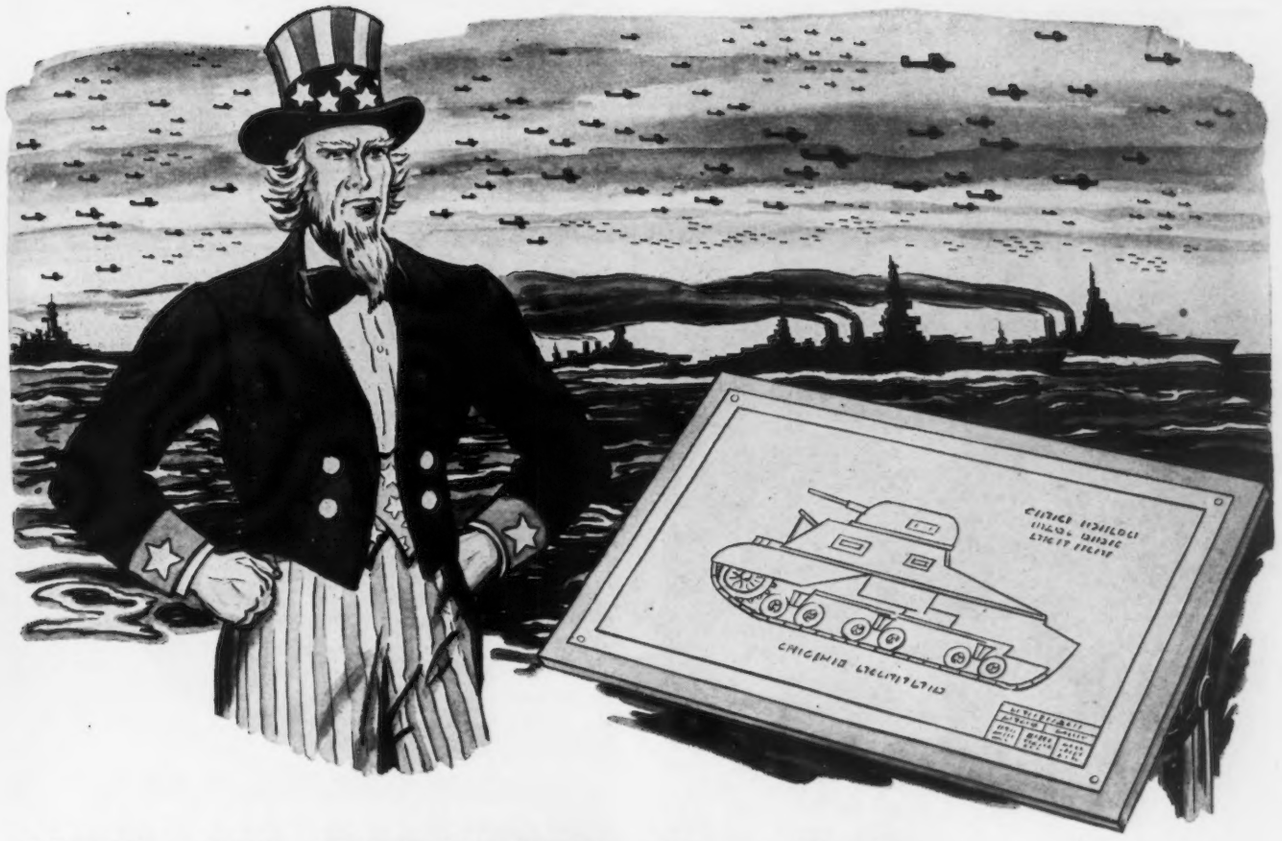

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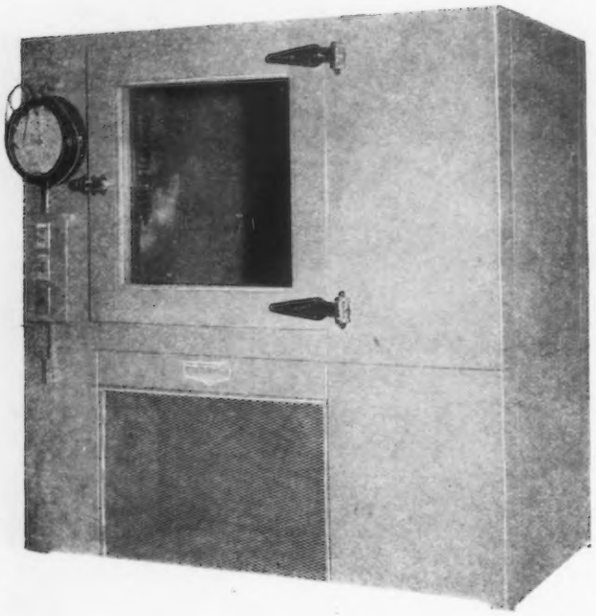
Superior FINISHES



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Test metals, instruments and various devices over a wide temperature range, and SEE the whole process through the large glass door provided in the Kold-Hold "Hi-Low" cabinet.

Temperature range from minus 75° F. to plus 150° F. and higher is covered quickly. Unit is entirely self-contained. The direct-expansion refrigeration system is factory installed, tested and guaranteed. Practically no maintenance cost.

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has accentuated the need for designing service

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The Iron Age's Sub-Contracting Section, pages 550 to 556, offers engineering firms a most direct method of contacting metal-working companies. The Iron Age is read by over 100,000 men, most of whom are key men in metal-working plants.

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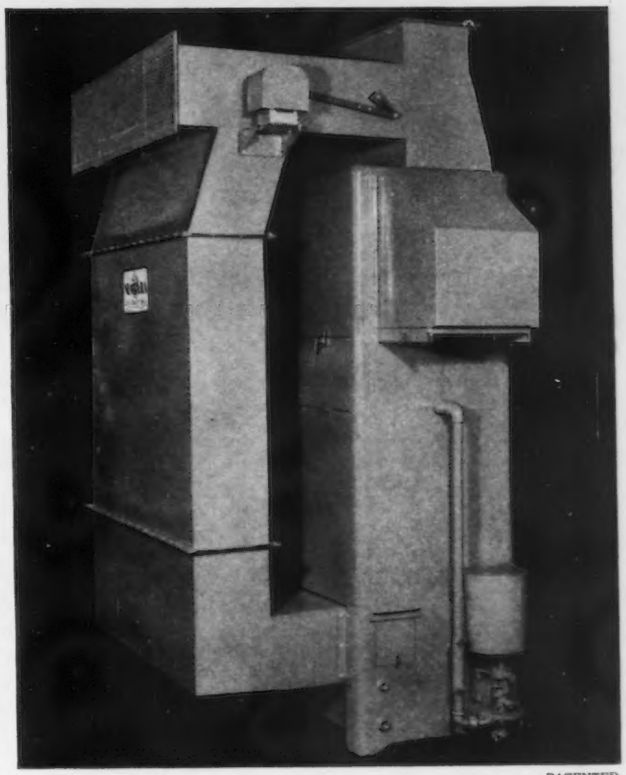

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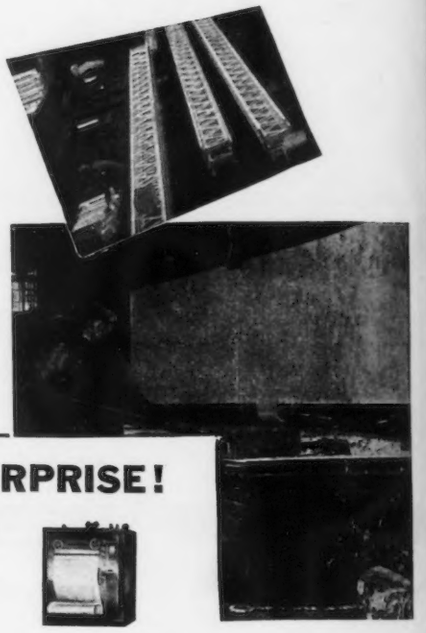
planned and manned to handle

LARGE TONNAGES!

AT ENTERPRISE . . . Thoroughly experienced, skilled workmen, in a newly enlarged and completely equipped plant, work under the direction of responsible ownership-management. Large size kettles, adequate handling facilities and storage space, enable us to fill war orders of any size—promptly—efficiently—to highest quality standards.



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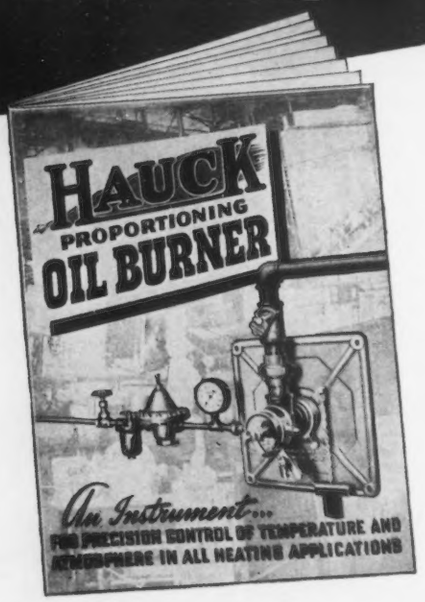
with ACCURATE TEMPERATURE CONTROL

with LESS FUEL CONSUMPTION AND LABOR



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TELLS HOW

Simple and easy it is to eliminate guesswork on air-oil ratios and variations in furnace or oven temperature and atmosphere; how you can reduce fuel consumption, spoilage losses and the need for highly trained burner supervision.

TELLS WHY

Over 50 furnace, oven and air heater builders specify and include Hauck Proportioning Oil Burners on their equipment; why over 14,000 of these burners in 615 plants are helping to push heating production at top speed.

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No Job "Too Big" for A Mult-Au-Matic

If it involves machining metal — particularly at the rates and to the requirements that 24-hour-a-day war work demands, have it estimated for a Mult-Au-Matic.

What is being done in hundreds of engine, plane, tank, gun and shell plants can be done in your plant.

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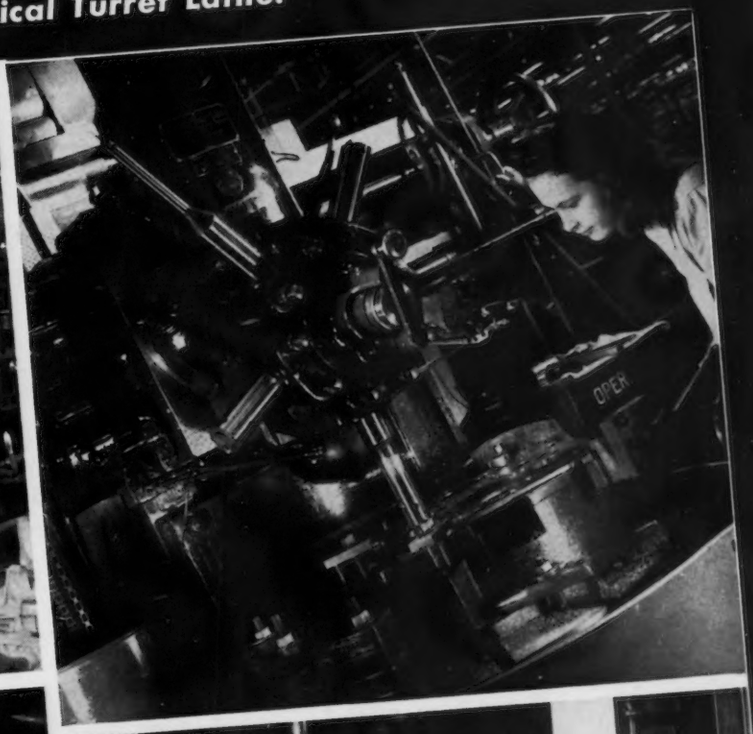
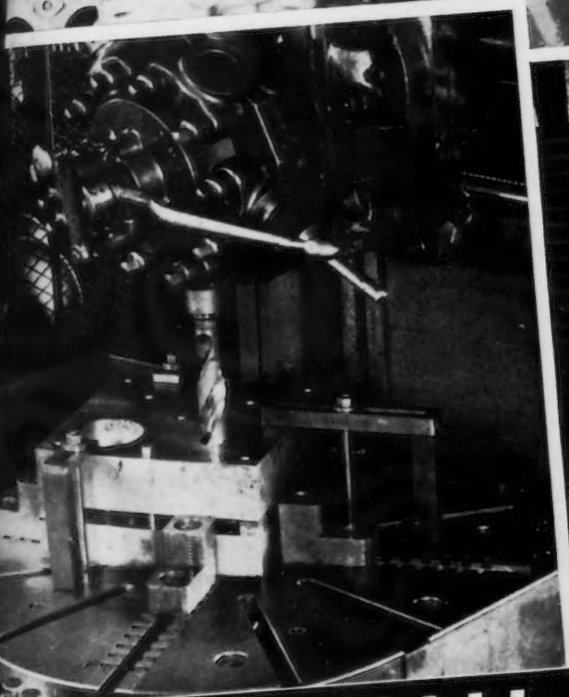
No Part "Too Complicated" for V.T.L.

Here are big parts, little parts, simple parts, complex parts. One and all, they come off a V.T.L. faster, more accurate, and with a lower cost than you can meet anywhere else. Put to work, in your plant, the experience that has created one of America's best known and most reliable machine tools — The Bullard Vertical Turret Lathe!





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Armament production men working on "impossible" completion schedules appreciate more than ever the value of BAY STATE's consistently superior abrasive products. Such "engineered-in" features as Fractional Grades, Controlled Porosity, and H-9 Vitrified Bond have eased to a tremendous degree their great task of obtaining maximum output in minimum time, with ever-increasing grinding efficiency.
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Accuracy That Speeds

Accuracy in the production of parts in aircraft plants employing mass-production methods is a vital necessity.

Hendey Lathes and Shapers, in the toolroom and production departments of leading aircraft plants, are

THE HENDEY
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BRANCH OFFICES: BOSTON

Below: At the Vega Aircraft Corporation plant, a Hendey 12" x 30" precision-production lathe is shown finishing a grooved aluminum drum for a control assembly.

DEY

Aircraft Mass-Production

doing their part to speed aircraft mass-production both by the accuracy of their work and by their ease of operation. Choose them when your jobs of war production call for close tolerances and your schedule demands high output.

MACHINE COMPANY

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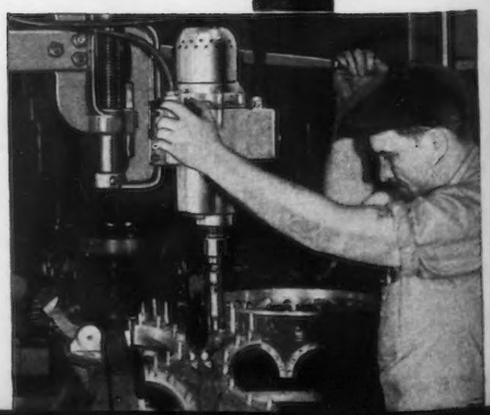
SHAPERS

Below: This battery of Hendey Shapers in the toolroom of the Vega Aircraft Corporation plant is responsible for the rapid production of all types of precision jigs, dies and fixtures.

First the

FOR RECONDITIONING VALVES
and valve seats, at airdromes and in combat zones, Black & Decker Electric Valve Refacers and Valve Seat Grinders do factory-accurate work at war-emergency speed.

FOR SETTING STUDS
in aircraft engines (illustrated), or driving anything from tiny screws to large nuts and bolts, Black & Decker Power Drivers speed many assembly operations.



Hum of Drills — Then the SHRIEK of Bombs!

BLACK & DECKER Electric Tools help produce a War Plane every 9 minutes!

THE Black & Decker Holgun is the most widely used electric tool in the aircraft industry. Light, compact, with "Pistol Grip and Trigger Switch," the Holgun 1/4" Drill is designed for work in tight places, won't heat up under extreme service. Holgun comes in torques and spindle speeds for production drilling in all types of aircraft materials—in parts, sub-assemblies and assemblies—in armaments, instruments and equipment.

The Holgun is just one of many Black & Decker Portable Electric Tools used to speed aircraft production, maintenance and repairs. Drills and Tappers, Screw Drivers and Nut Runners, Grinders and Sanders, Saws and Sheet Metal Shears—all are playing their part in speeding American airpower into action. One plane every 9 minutes! That's America's 1942 *average*. Production is actually faster than that *right now!*

Expert Help—QUICKLY!

For advice on any tooling problem, and as a dependable, convenient source of supply, 'phone your nearby Black & Decker Distributor. Or write to: The Black & Decker Mfg. Co., 751 Penna. Ave., Towson, Md.

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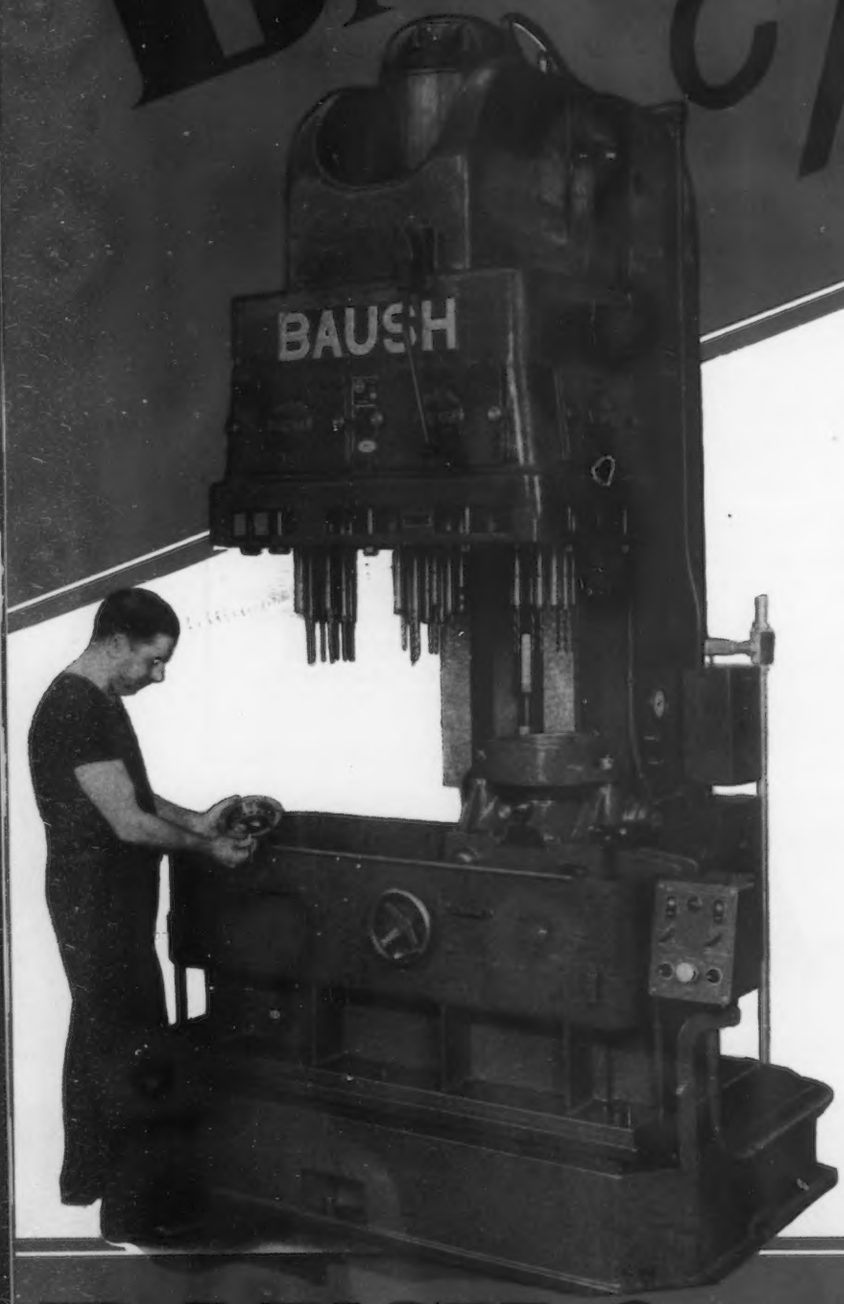
PORTABLE ELECTRIC TOOLS

FOR SHEET METAL CUTTING
Black & Decker Lectro-Shears handle intricate pattern work or straight line cutting at top speed. Lectro-Shears are available in 16-gauge and 18-gauge models.

FOR PRODUCTION DRILLING
the Holgun 1/4" Drill comes in a variety of spindle speeds, from high torque at 500 R.P.M. to high speed at 5,000 R.P.M. Other drill models range from 3/16" to 1 1/2".

BAUSH Means



And today that means war business—supplying manufacturers with Baush Multiple Spindle Drills so that they can turn out their work faster.

Here are typical examples. In one plant 360 holes per hour are drilled in a certain type of airplane part on one machine. In another plant a Baush Multiple Drill is doing a job in 12 minutes which formerly required 80 minutes on other machines.

These examples are not a flash in the pan. They are typical of what Baush machines are doing in hundreds of plants operating long hours on a seven-day week schedule.

Write for bulletin giving construction and operating details of Baush high-production Multiple Spindle Drills.

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The Army and Navy Star has been awarded to us in recognition of our fine war production record - - - - - - -

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RADIAL DRILLING & TAPPING MACHINE

Here is a distinct aid to the rapid performing of accurate drilling and tapping operations wherever work is done on a single spindle basis. This precision machine takes a 1/2" drill in steel; countersinks; and performs lead screw tapping that gives you a class #3 and #4 fit automatically in one operation — no rough tapping required. Quickly changed from drilling to tapping.

FEATURES

Tapping

Precision Lead Screw
Quick Lead Screw Changeover
Floating Principle
Automatic Depth Control and Return
Compensating Spring in Lead Screw Assembly
Start and Reverse Buttons

Drilling and Countersinking

Morse Taper Quill
Mechanical Depth Control
Start and Stop Buttons

Work Area 35 sq. ft. within an Arc of 360°
"Feather Touch" Arm Movement
Instant Vertical Spindle Adjustment
Infinitely Variable Speed Drive
Drills and Taps Work up to 4 ft. high
Knee Table Capacity 22" x 26"

Drills and Tappers . .

Dictate a memo t

to Bryant

Don't wait until you get stuck on a problem of internal grinding. Even though it looks relatively simple, dictate a memo to Bryant and mail it to Bryant with blueprints.

Bryant engineers may possibly uncover more than one difficulty that is not at first apparent — uncover it and overcome it.

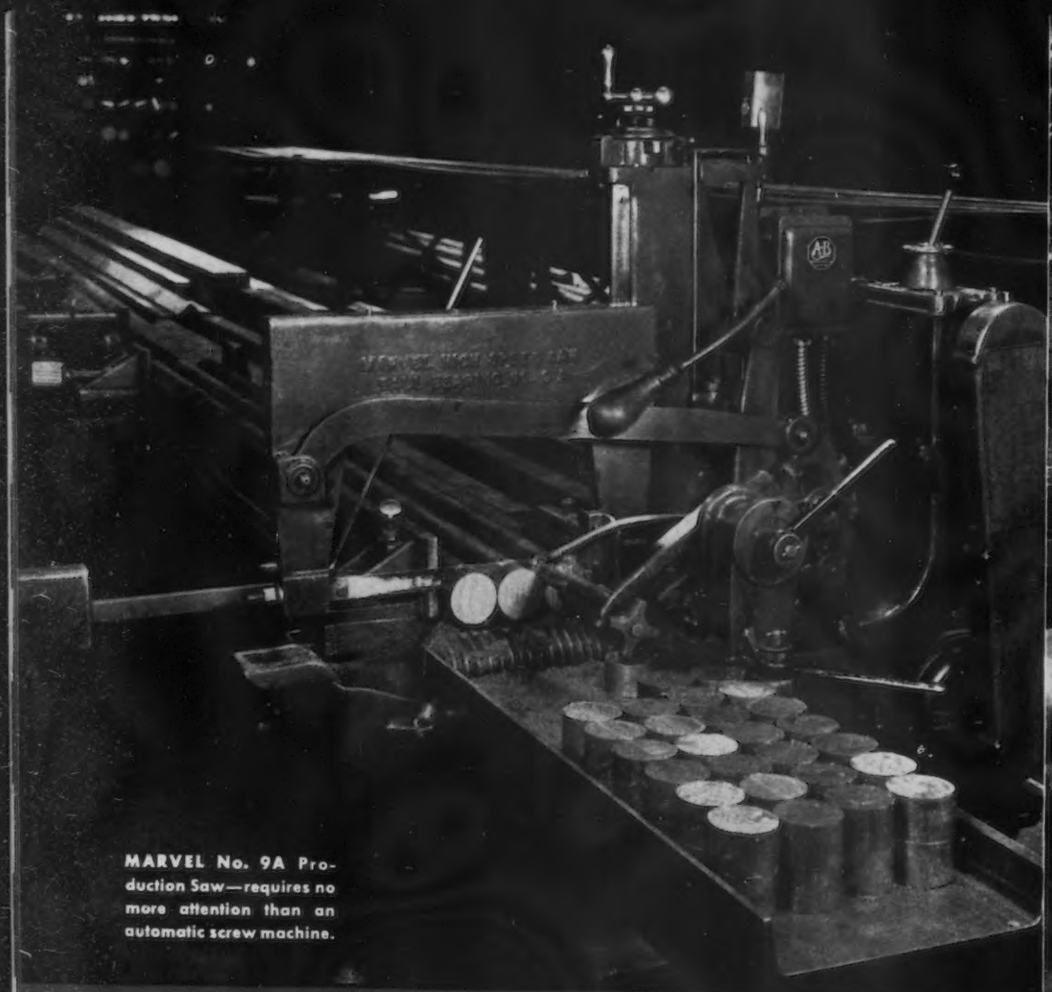
That often happens when they dig under the surface on a simple looking job. Almost as often Bryant engineers also reveal unexpected ways to combine operations, to cut costs and reduce spoilage.

And please remember that it will not obligate you to dictate a memo to Bryant. Bryant production capacity has already been tripled, and it is constantly increasing. Every day Bryant engineering studies are being rushed for manufacturers with defense contracts. At the same time, Bryant engineers are also pushing steadily ahead with plans for far-sighted firms — plans for cutting costs and increasing profits on peace time products for tomorrow's markets.

If you too believe in planning ahead for post-war profits, let Bryant engineers begin to help you at once. It will not obligate you to dictate a memo to Bryant.

BRYANT CHUCKING GRINDER CO.

SPRINGFIELD, VERMONT, U. S. A.



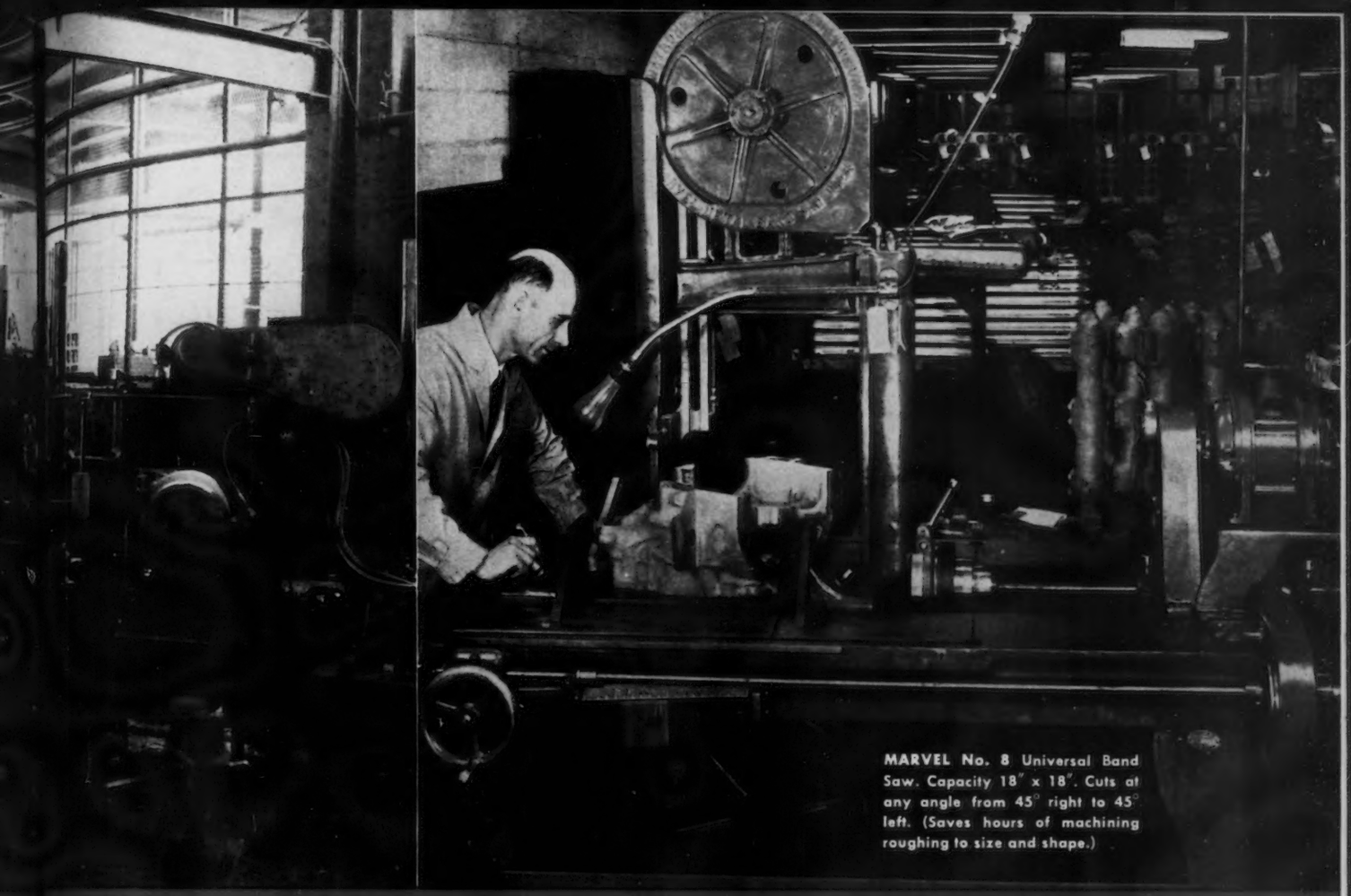
MARVEL No. 9A Production Saw—requires no more attention than an automatic screw machine.

MARVEL No. 18 Giant Hydraulic Hack Saw handles toughest steels easily. Capacity 18" x 18".

MARVEL SAWS

MARVEL'S years of Pioneering have given AMERICA the World's *Fastest* Hack Saws

ARMSTRONG-BLUM MANUFACTURING COMPANY *"The Hack Saw People"* 5700 BL



MARVEL No. 8 Universal Band Saw. Capacity 18" x 18". Cuts at any angle from 45° right to 45° left. (Saves hours of machining roughing to size and shape.)

THRU THE YEARS MARVEL engineers have transformed hack sawing from a slow, tedious, "plugging along" operation into a fast, accurate and, when desired, automatic method of cutting-off, and a time-saving means of roughing to size and shape. Today's MARVEL Saws are found not only in well ordered stock rooms but take their place in production lines and tool rooms as well.

As a prerequisite to modern high speed metal sawing, MARVEL developed the first positively unbreakable high speed hack saw blade—a composite blade that combined the toughness of its alloy steel body with the cutting quality of its high speed edge. Then with a saw blade that could stand up indefinitely under any speed, feed and tension, MARVEL began the development and manufacture of the first truly high speed hack saws and the first "self-feeding" hack saws with automatic bar push-ups.

Then came the modern heavy-duty, all-ball-bearing MARVEL 6A and 9A Production Hack Saws that are doing so much to speed up America's War Program, and the giant No. 18 MARVEL Hydraulic Hack Saw that accurately cuts off the largest sizes and toughest steels easily and speedily. These, with the versatile MARVEL No. 8 Band Saw, which makes an unlimited variety of cuts, are found "holding their sector" in almost every war production line.

Wherever "maximum speed" and ultimate reliability are required for war production jobs, you are almost certain to find that the metal sawing machines are MARVELS.

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PLAIN MILLING MACHINE

featuring

★ INFINITE SPINDLE SPEEDS
★ MOTOR-IN-BASE DRIVE
★ STANDARDIZED SPINDLE NOSE
★ HEAVY RUGGED CONSTRUCTION

Applicable to the Needs of National Defense . . .

CONDENSED SPECIFICATIONS

TABLE WORKING SURFACE — 46" x 10½"

LONGITUDINAL POWER FEED —25"

TRANSVERSE POWER FEED — 9"

VERTICAL HAND FEED—17½"

MAX. DISTANCE SPINDLE TO TABLE — 19"

SPINDLE SPEEDS — Infinite

RANGE OF SPINDLE SPEEDS — 25-500 R.P.M.

NUMBER OF GEARED FEEDS — 16

RANGE PER SPINDLE REVOLUTION—.005" to .212"

NET WEIGHT — 4240 LBS.

The American Milling Machine renders outstanding service to shops engaged in armament production. From frame to spindle to table and knee, this miller possesses the features which contribute to fast and accurate milling production.

Bottle-necks need bother you no longer when you can get delivery on up-to-date milling machines like these—priority rating required.

Write for literature describing more fully the advanced features of construction.

J. L. LUCAS & SON, INC.

BRIDGEPORT, CONNECTICUT, U.S.A.

Rebuilding YOUR Machines
THE "LUCAS" WAY

Here is a new machine tool plant operated by an experienced concern, and devoted to rebuilding machine tools for you.

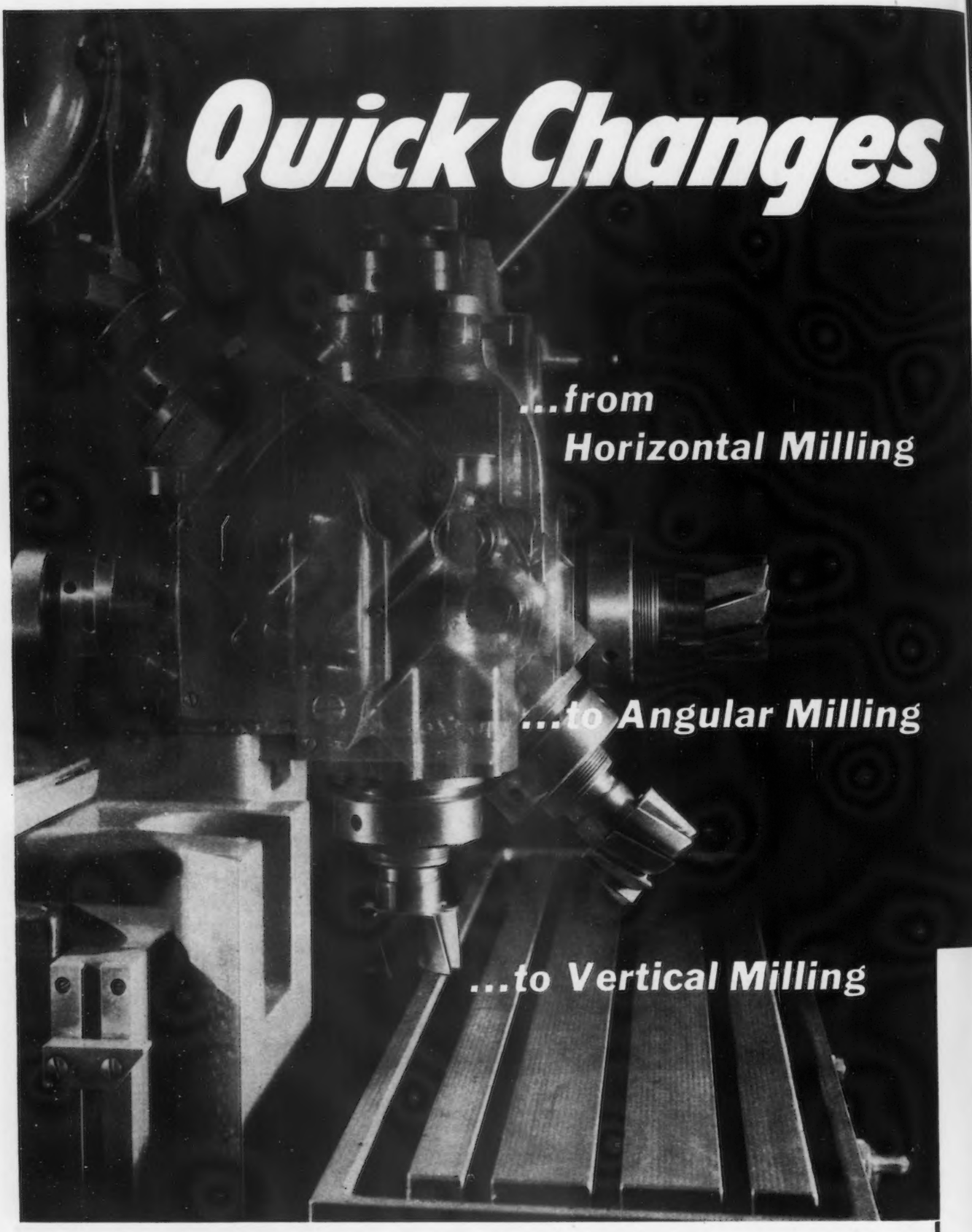
For many manufacturers we have recaptured the lost accuracy and efficiency of their worn machine tools. This we did by rebuilding *the "Lucas" way*, and this service is now available to a greater number of manufacturers because of our new plant.

The "Lucas" Way means stripping the machines down to the bare frames, machining and fitting worn surfaces, installing new parts where needed, and in every practical way making your machines as good as when they were new. Send for illustrated booklet describing *the "Lucas" way* of rebuilding.

SPOTTING—This close up shows the beauty of this essential treatment of oil bearing surfaces.

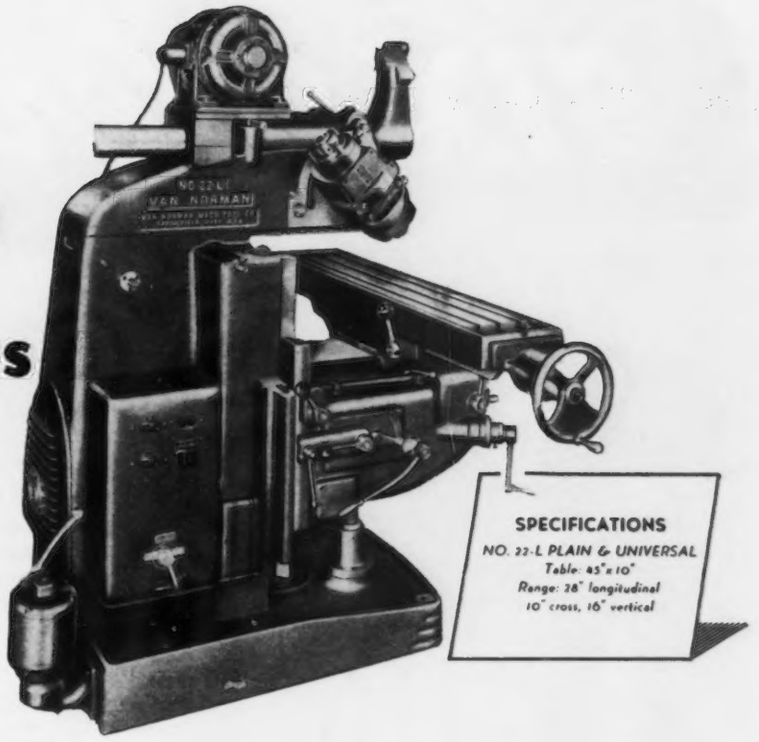
J. L. LUCAS & SON, INC.

BRIDGEPORT, CONNECTICUT, U.S.A.



VAN NORMAN MACHINE TOOL COMPANY

ON VAN NORMAN RAM-TYPE MILLING MACHINES



When the operator has completed a horizontal cut on a Van Norman Ram-Type Miller, and wishes to proceed to an angular or vertical cut . . . *he does not need to touch the set-up on the table.* All he has to do is unclamp the swiveling cutterhead, swing it to the required position, reclamp . . . *and start the next cut.* Only a matter of moments, compared with the time needed to reset the work. And one of the greatest sources of errors is completely avoided. This exceptional ease and convenience of operation provide gains in time, accuracy and output. So today, throughout America's war industries, Van Norman Ram-Type Millers are delivering the goods in great plenty . . . and in plenty of time.

Van Norman

MILLING MACHINES

ARMY E NAVY

In June, 1942, Van Norman was awarded the Army and Navy E in recognition of its war production record

SPRINGFIELD, MASS.

SIX Versatile

Versatility in quick adaptability to varying job requirements is one wartime advantage of the six Oster machines illustrated.

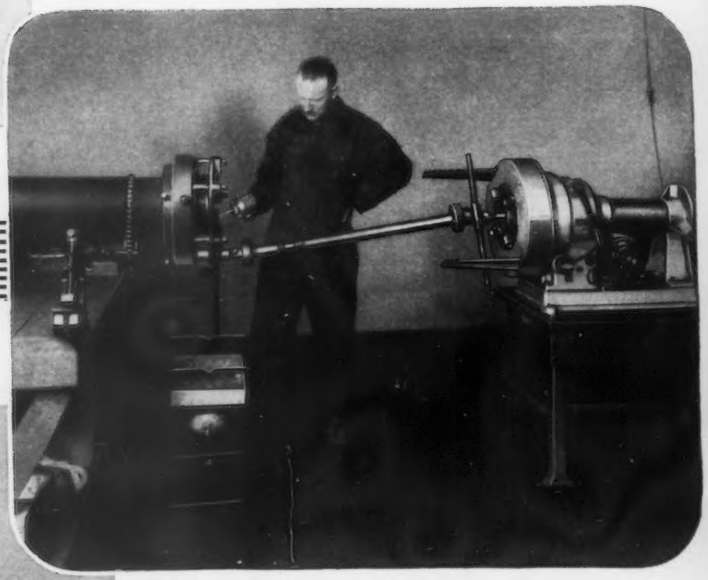
Another timely advantage of all six machines is their *simplicity* of design and operation. Rapid training of new workers is a resultant advantage.

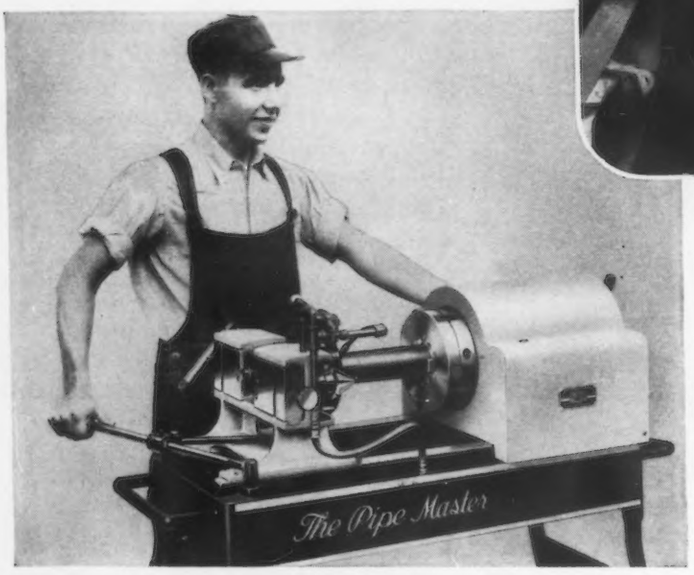
Four of these Oster machines are *portable* pipe and bolt threaders. Each has its specific scope of advantages. Another machine is the Oster Power Vise Stand designed for use with your present hand pipe threaders, reamers, and cutters.

OSTER

Oster No. 422 Power Vise Stand. Puts power in your present hand die-stocks, reamers, and cutters. Note this example of TIME SAVED over the hand method:

5 minutes-27 seconds SAVED threading 2" pipe. Other sizes threaded at comparable time savings.





It takes only 38 seconds to thread 1" pipe, and only 45 seconds to thread 2" pipe on the Oster No. 414 "Power Boy." Other sizes in range of this machine show comparable speeds. The "Power Boy" is designed for use with the larger sizes of hand pipe tools. Also threads bolts from ½" to 1½" N. C. or Whitworth.

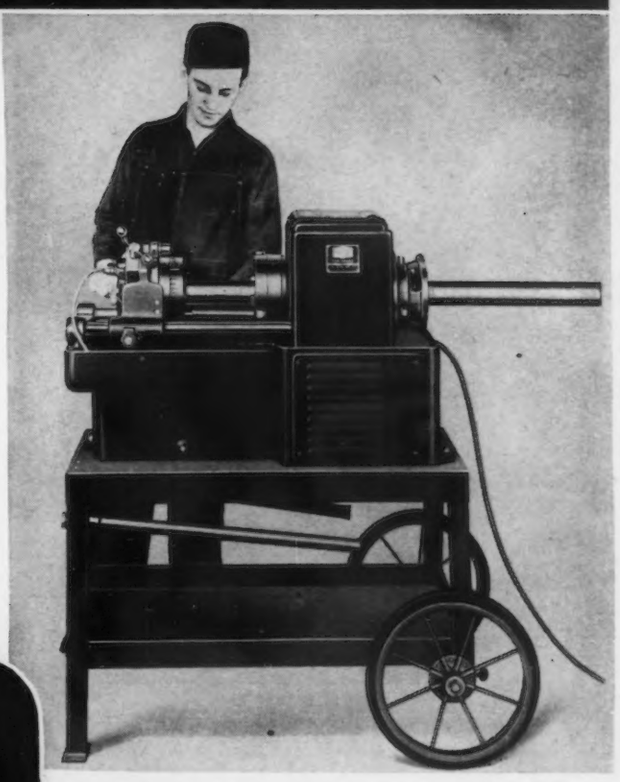
The Oster No. 502 "Pipe Master" is a complete, portable pipe and bolt threading machine which provides time saving advantages like these: 1" pipe cut off, reamed, and threaded in 3 minutes-41 seconds LESS time compared with hand method; 6 minutes-18 seconds saved on floor to floor operations on 2" pipe. This machine also threads bolts at high speeds.

TIME SAVERS!

The sixth machine in the group is the Oster No. 601 "RAPIDUCTION" Lathe, a power driven screw machine with manually operated, 6 position turret, or with plain saddle, as desired. Two types of drive are optional, DIRECT drive for high speed work on small diameters and non-ferrous metals; and WORM drive for transmitting a smooth flow of power for such work as making deep forming cuts with absence of chatter.

If interested in one or more of these modern machines, communicate with . . .

THE OSTER MANUFACTURING COMPANY
2038 EAST 61st STREET • CLEVELAND, OHIO, U. S. A.

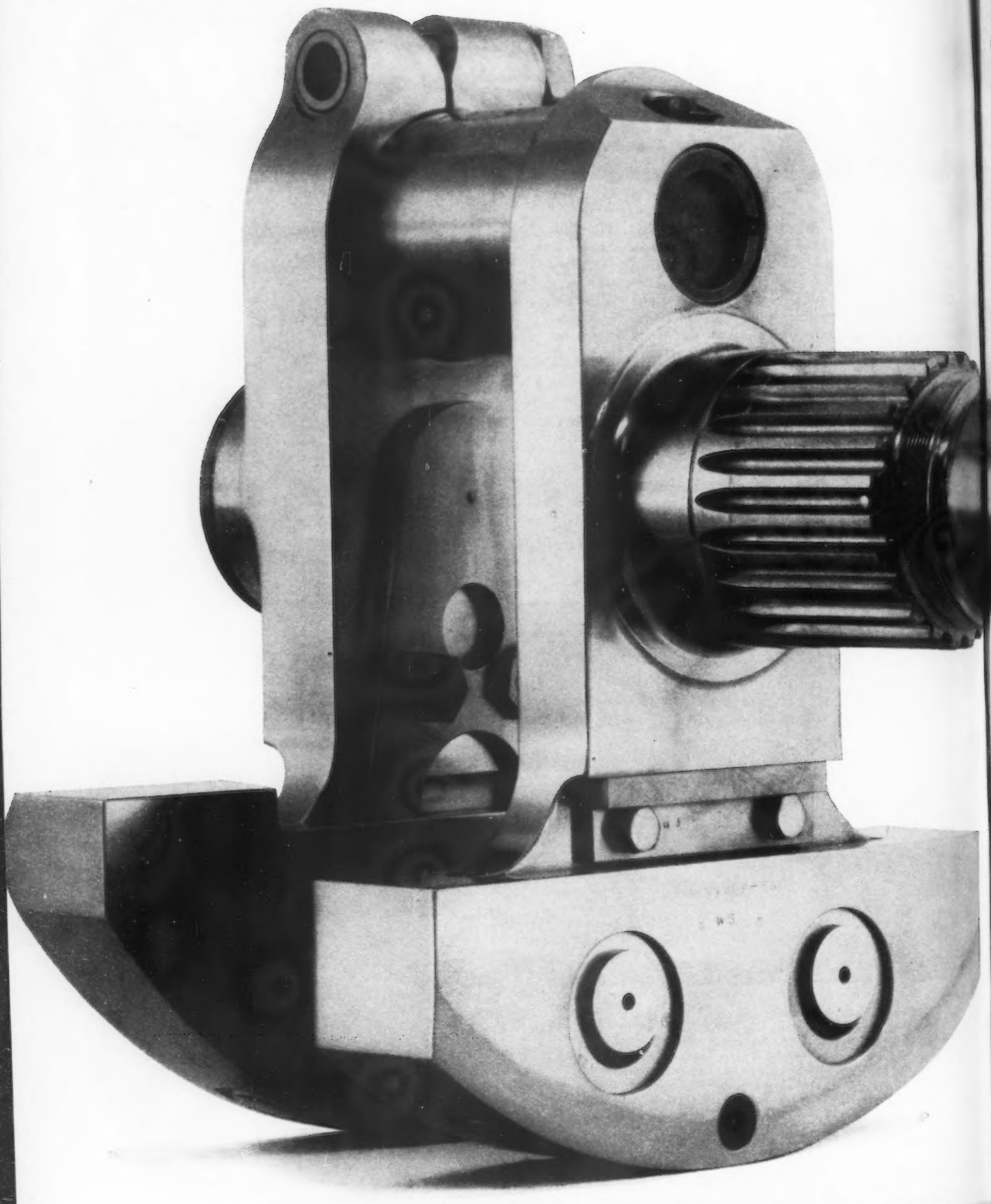


The Oster No. 562 "Tom Thumb" Portable Pipe and Bolt Threading Machine (illustrated at right) chucks, threads, reams and chamfers, and cuts off 1" pipe in 46 seconds; 2" pipe in 1 minute-11 seconds. Comparable speeds on other sizes within range of machine.

OSTER

SIMPLICITY of design and operation is one big advantage of the Oster No. 601 "RAPIDUCTION" Lathe (illustrated above). Equipped with six-position, manually operated turret, this modern, motor-driven screw machine performs a wide range of bar and chucking operations. New workers, men or women, are trained rapidly on the Oster No. 601 "RAPIDUCTION" Lathe.

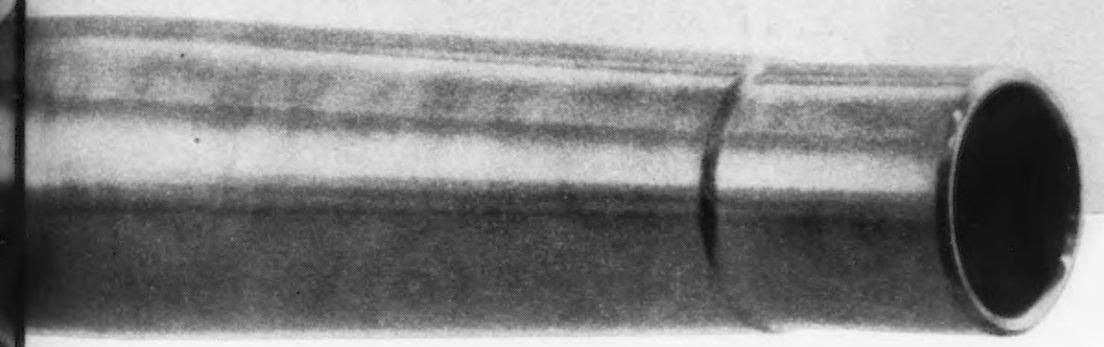
VERSATILITY in standard and unusual types of threading makes the Oster No. 531 "Tom Thumb" a wartime necessity in many plants. On all operations from floor to floor, No. 531 consistently chalks up speeds like these: 26 seconds on 1" bolts; 19 seconds on 1" pipe.



THE CARBORUNDUM

REG. U. S. PAT. OFF.

What's the most important half second in the life of a crankshaft?



YOU'RE looking at one of the sweetest pieces of precision engineering that ever stirred a craftsman's heart. Accurate as the balance wheel of your watch, this airplane engine crankshaft will soon be helping some pilot show the enemy what American men and machines can do.

However, in the split-second in which the final grinding operation on the shaft was completed, had the operator taken off just 0.001 inch more than the minimum diameter specified for the bearing, for instance, the shaft would never have seen action at all. Its value would have been reduced to scrap. And the staggering total of man and machine hours which had gone into it up to that point would have been worth absolutely nothing.

Can you find a single operation in war production where so much is at stake as in the final grinding process? Because of the key role it plays in war output, the grinding operation is one of the first places to check for ways to conserve materials, effort and time.

Make certain that your grinding machines are being operated with the utmost possible care. Make certain too that you are using the right grinding wheel for the particular job at hand. It is a *Weapon of Production* and should be properly used for maximum effectiveness.

Manufacturer's recommendations should be carefully followed on wheel speed, work speed, rate of infeed, wheel traverse, proper coolant and wheel grading (grit, grade and bond). Only the correct balance of these several factors will insure maximum production.

You are cordially invited to visit us at Booth C-122
National Metal Congress Exposition
Cleveland Auditorium, October 12-16.

COMPANY, NIAGARA FALLS, N. Y.

Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Pittsburgh, Cincinnati, Grand Rapids

(Carborundum and Aloxite are registered trade-marks of and indicate manufacture by The Carborundum Company)

CROSS *to fit* *DESIGNS & BUILDS Your Requirements*

PROFIT DEFENSE

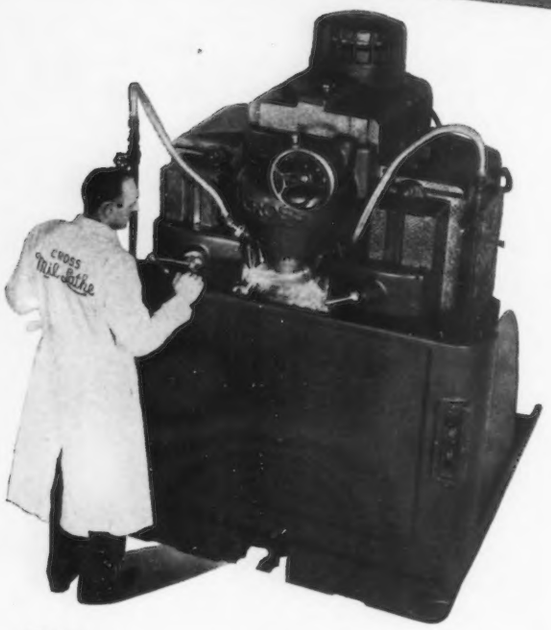
Patriotism demanded immediate production at any expense but the American Way also recognizes and rewards efficiency. Your profit margins can be successfully defended with special machinery engineered to consolidate operations, reduce work handling, increase productivity of available labor, decrease spoilage and, last but not least, maintain improved accuracy with inexperienced help.

Cross analyzes manufacturing problems, develops new methods, engineers and builds special machinery for doing better work faster and in accord with a predetermined plan.

CROSS GEAR & MACHINE COMPANY

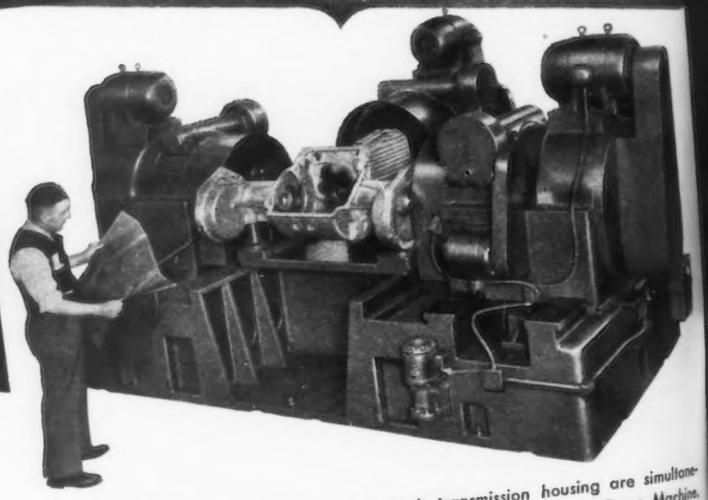
Detroit, Michigan *Established 1898* **Telephone: PLaza 3000**

S-5



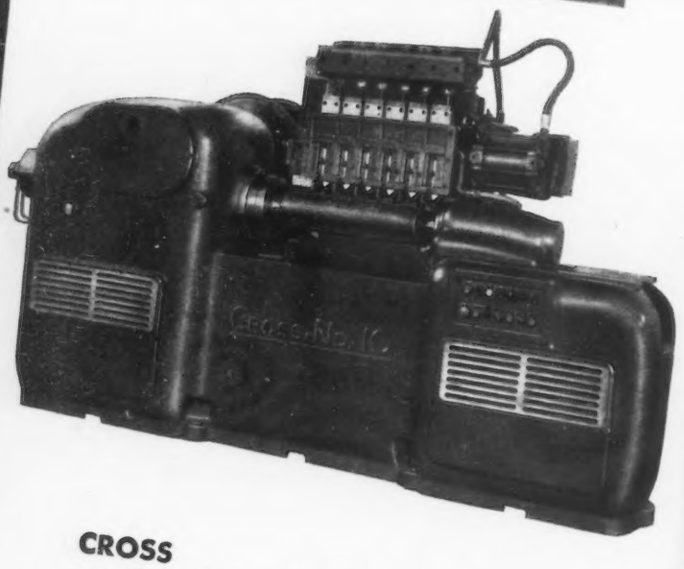
CROSS *MilLathe*

The MilLathe is a Cross development for accurately turning cylindrical, conical or flanged work with multiple edge cutters. Two pieces of work are finished at the same time on diametrically opposite sides of the cutters.



CROSS 3 WAY MILLING MACHINE

Three faces on a tank transmission housing are simultaneously milled to a profile with this Special Cross Machine. Arrangements were made to process either aluminum or cast iron parts with only a minor adjustment in set up. The operating cycle is entirely automatic with electric push button controls.



CROSS *Shell* **LATHE**

Cross Shell Lathes are universally recognized for their faultless performance, unusual flexibility and ease of operation. 100 horse power is provided to take full advantage of multiple carbide tooling while maintaining large volume production schedules.

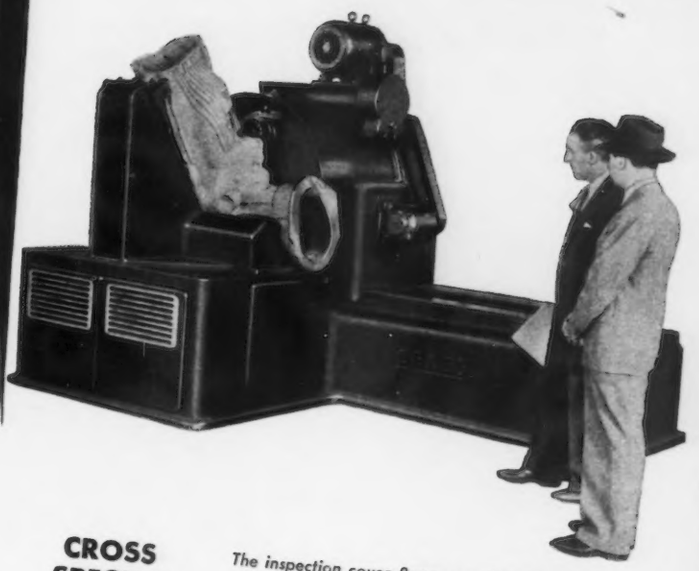
CROSS SPECIAL GUN BARREL MACHINE

Twenty-seven difficult profiling operations are accurately completed by unskilled labor on anti-aircraft gun barrels. Many hours of difficult hand work were eliminated.

SPECIAL MACHINERY

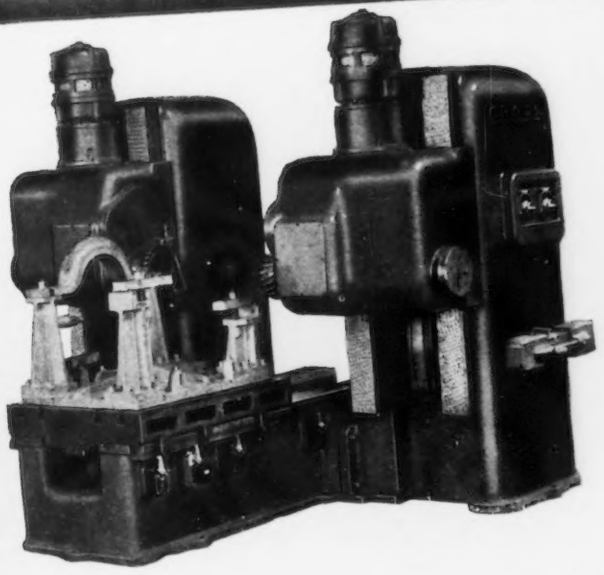
CROSS SPECIAL MACHINE FOR BREECH RINGS

Volume production was attained with this Special Cross Machine for milling an intricate recess inside of breech rings for anti-aircraft guns. Construction features: right angle cutter spindle, automatic lead compensation, ball bearing gibs for the work carriage.



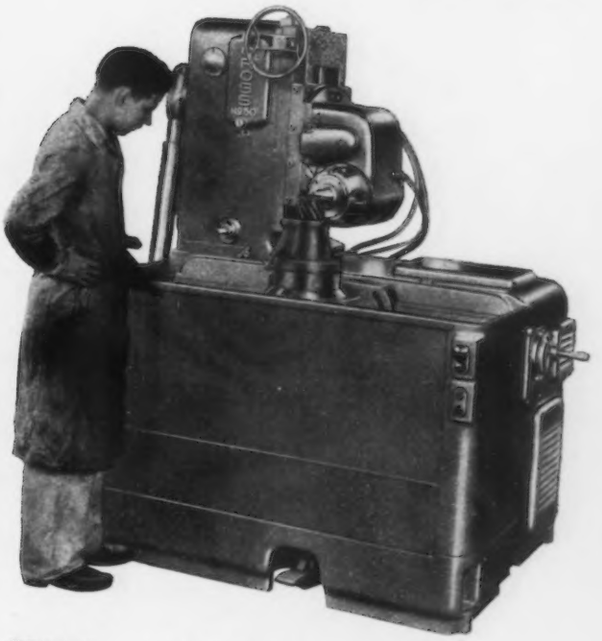
CROSS SPECIAL PROFILE MILLER

The inspection cover flange on aluminum or cast iron tank final drive housings is profiled to a smooth finish with an operation that is completely mechanized and fully automatic. Unit construction features flexibility for handling a wide variety of work.



CROSS AUTOMATIC DUPLEX MILLER

A Special Cross Milling Machine, with opposed cutter heads and independent feeds which operate in synchronized relationship with the table feed, simultaneously finishes dissimilar ends of a cast iron gear case. A centralized push button station controls the full automatic operating cycle.



CROSS NO. 50

The No. 50 Cross is a universal gear chamfering machine which will produce a variety of forms on the ends of a wide range of internal or external gear teeth with a "pencil point" cutter. Equally suitable for job lots or large volume production, it can be set up quickly without preliminary special equipment.

CROSS GEAR & MACHINE CO.

Established in 1898

DETROIT, MICHIGAN, U.S.A.

RACINE *High Speed* OIL CUT SAWS

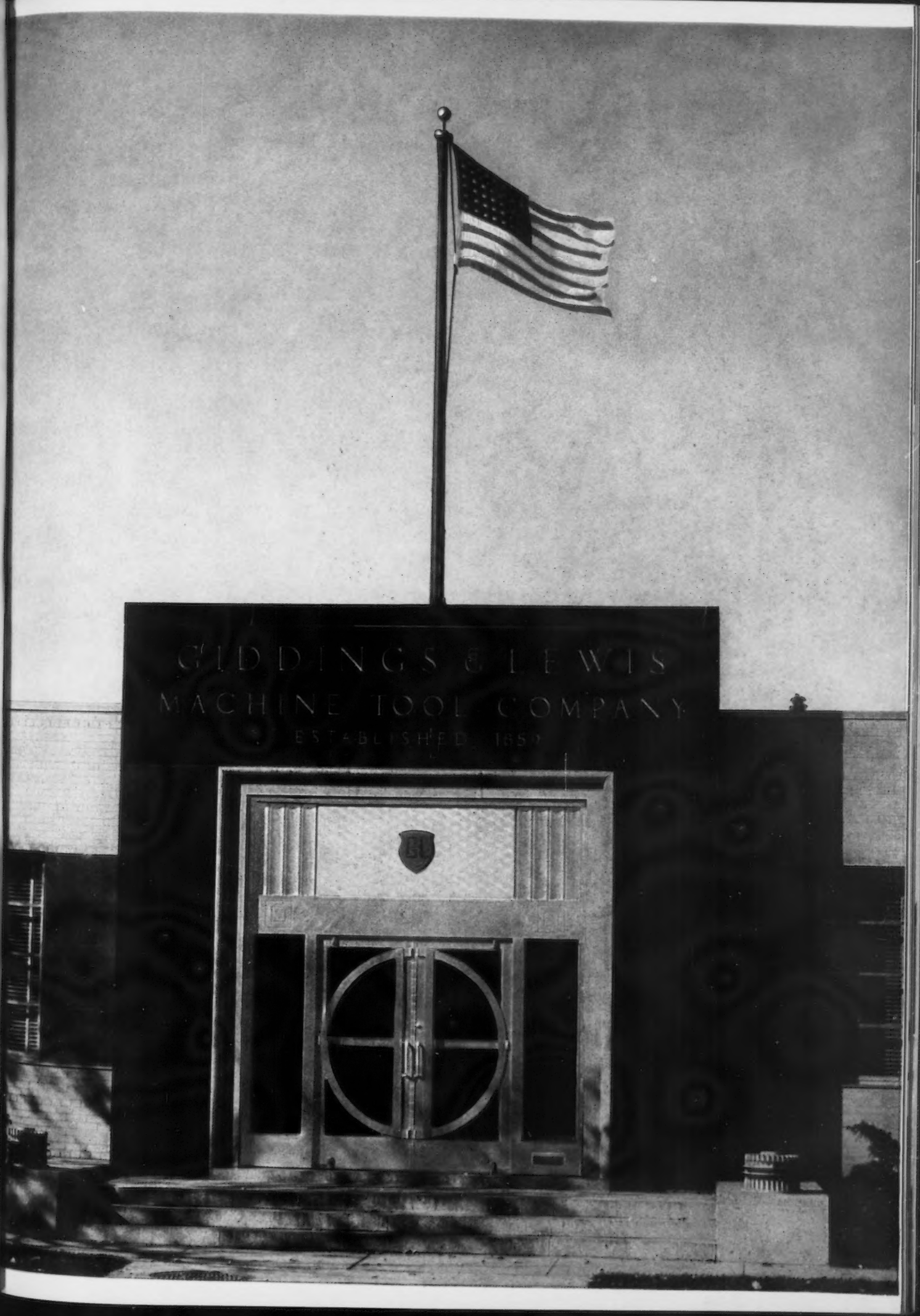
RACINE Hydraulic Oil Cut saws are in the spotlight as one of the outstanding metal cutting machinery developments. They are simple and compact; designed with a rugged cast iron ribbed construction for production work. Capacity is 6″ x 6″ with full hydraulic control of cutting feeds and cutting pressures. Saw frame and saw guide are of "V" design to insure accuracy under heaviest cutting feeds.

Each machine has a built in 3-speed sliding gear transmission, two sets of quick acting vise jaws, provision for cutting angle up to 45° and separate coolant pump and reservoir.

A simple fool proof machine built to cut ordinary cold rolled free cutting steels at 5 square inches a minute and tough alloys and tool steels at 1, 2 or 3 square inches a minute.

Write for our catalog 60-A describing these modern machines. RACINE has a complete line from 6″ x 6″ up to 14″ x 20″ high speed production and general purpose metal cutting machines with and without automatic bar feed. In every metal cutting department a RACINE saw will steal the show. Write for cutting time data in your particular stock and check for yourself.

RACINE TOOL & MACHINE CO.
1755 STATE ST. ··· RACINE, WIS.


GIDDINGS & LEWIS
MACHINE TOOL COMPANY
ESTABLISHED 1859

WE HAVE BEEN HONORED WITH THIS

Symbol

Presentation MADE SEPTEMBER 17th, 1942

OF PRODUCTION *Excellence*

THE boys out on the firing line face the enemy with but one thought—VICTORY. Such is the reward they seek. They are not concerned about earning medals—personal glory is not the thing that flashes through their minds as they valiantly carry on.

Here back of the line but in hand to hand effort wtih our boys, Industrial America is daily showing its patriotism and its determination to aid in bringing victory to the allied nations.

We are a unit in that effort.

Long ago the call came for more and more G&L High Power Precision Horizontal Boring, Drilling and Milling Machines — there was immediate need for G&L's in plants from coast to coast — these were the tools that would give added speed to America's armament production.

At the call we responded — every employee in the company took upon himself a new responsibility — personal gain was not the objective. Our employees, like the men in our armed forces, do not look for medals — it is the will to produce in bigger and better fashion that activates this whole big organization.

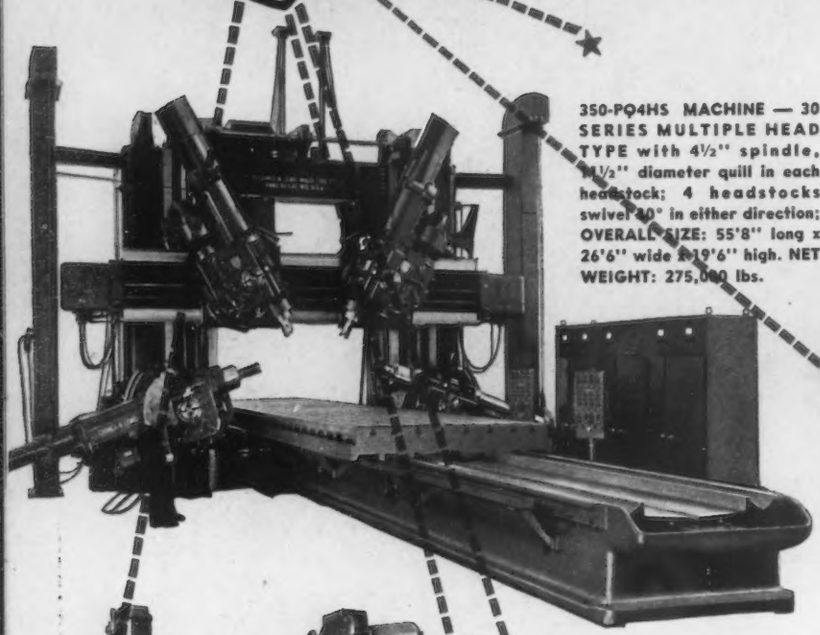
Our reward right along has been to see the number of G&L's that go into service and the job they are doing.

Now we are recipients of the Army-Navy Production Award of which we are more than proud. Not only does the "E" flag fly over our plant, but the "E" badge is worn by every member of our force. All credit to these men and women who have backed Uncle Sam with noble effort and will continue to do so as long as there is a Victory job to do.

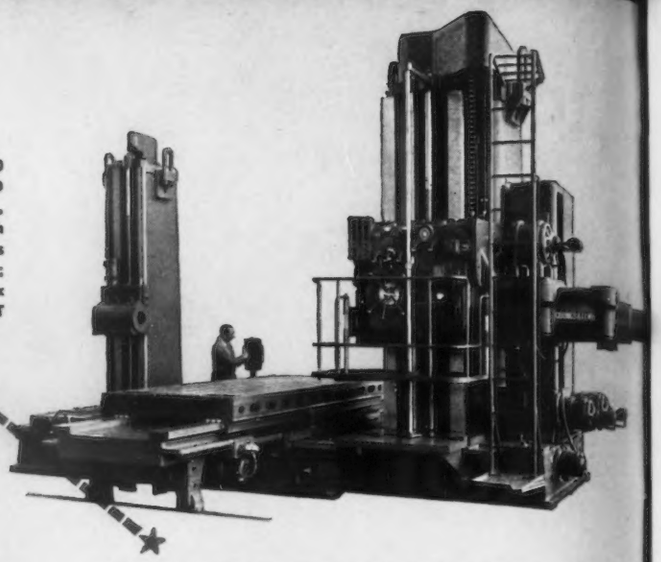
GIDDINGS & LEWIS MACHINE TOOL CO.

Fond du Lac, Wisconsin

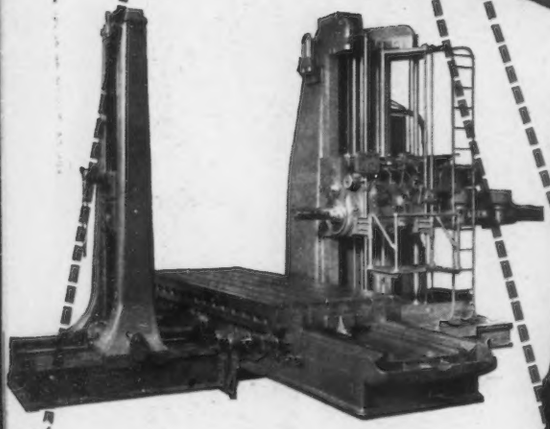
HORIZONTALS FOR DEFENSE



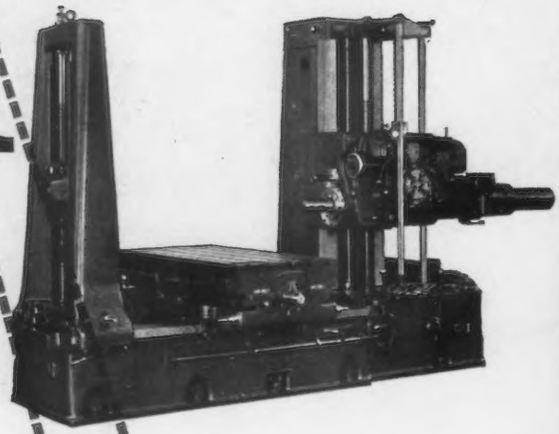
350-PQ4HS MACHINE — 30 SERIES MULTIPLE HEAD TYPE with 4½" spindle, 11½" diameter quill in each headstock; 4 headstocks swivel 30° in either direction; OVERALL SIZE: 55'8" long x 26'6" wide x 19'6" high. NET WEIGHT: 275,000 lbs.



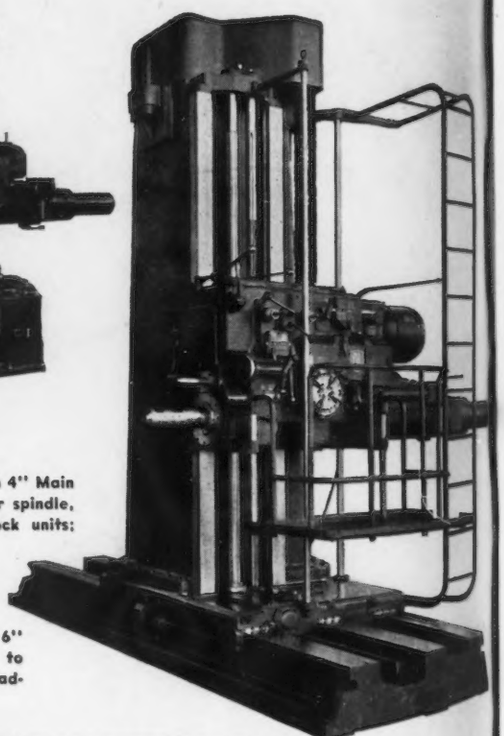
560-T MACHINE—50 SERIES TABLE TYPE with 6" main spindle, 2½" auxiliary spindle; 45 speeds to either spindle, 21 distinct independent feeds to Table Saddle and headstock units; NET WEIGHT: 140,000 lbs.



780-P MACHINE: 70 SERIES PLANER TYPE with 8" main spindle, 3½" auxiliary spindle; 36 speeds to either spindle; 18 feeds to table, headstock and column units, NET WEIGHT: 200,000 lbs.



340-T MACHINE—30 SERIES TABLE TYPE with 4" Main spindle, 2" auxiliary spindle; 36 speeds to either spindle, 18 milling feeds to table, saddle and headstock units; NET WEIGHT: 75,000 lbs.



360-F MACHINE—30 SERIES FLOOR TYPE with 6" main spindle, 2" auxiliary spindle; 36 speeds to each spindle; 18 milling feeds to column and headstock units; NET WEIGHT: 50,000 lbs.

Largest Manufacturers of Horizontal Boring, Drilling and Milling Machines in a complete line of Table, Floor, Planer and Multiple Head Types.

We make machines with spindle diameters from 2½ inches to 8 inches inclusive

GIDDINGS & LEWIS MACHINE TOOL CO.

FOND DU LAC, WISCONSIN

UNION

Lasting Accuracy

You will have fewer production delays because the accuracy of Union Tools lasts longer. Our research engineers have taken in consideration the characteristics of the newest metals and alloys and all other factors affecting the efficiency in metal cutting.

They have incorporated in Union Tools the knowledge that they have obtained through a great many years of research and it is for this reason that Union Tools give lasting accuracy and maximum production. The satisfactory service that you obtain from these tools is why Union becomes "The tools you buy again."

UNION TWIST DRILL CO. • Athol, Mass.

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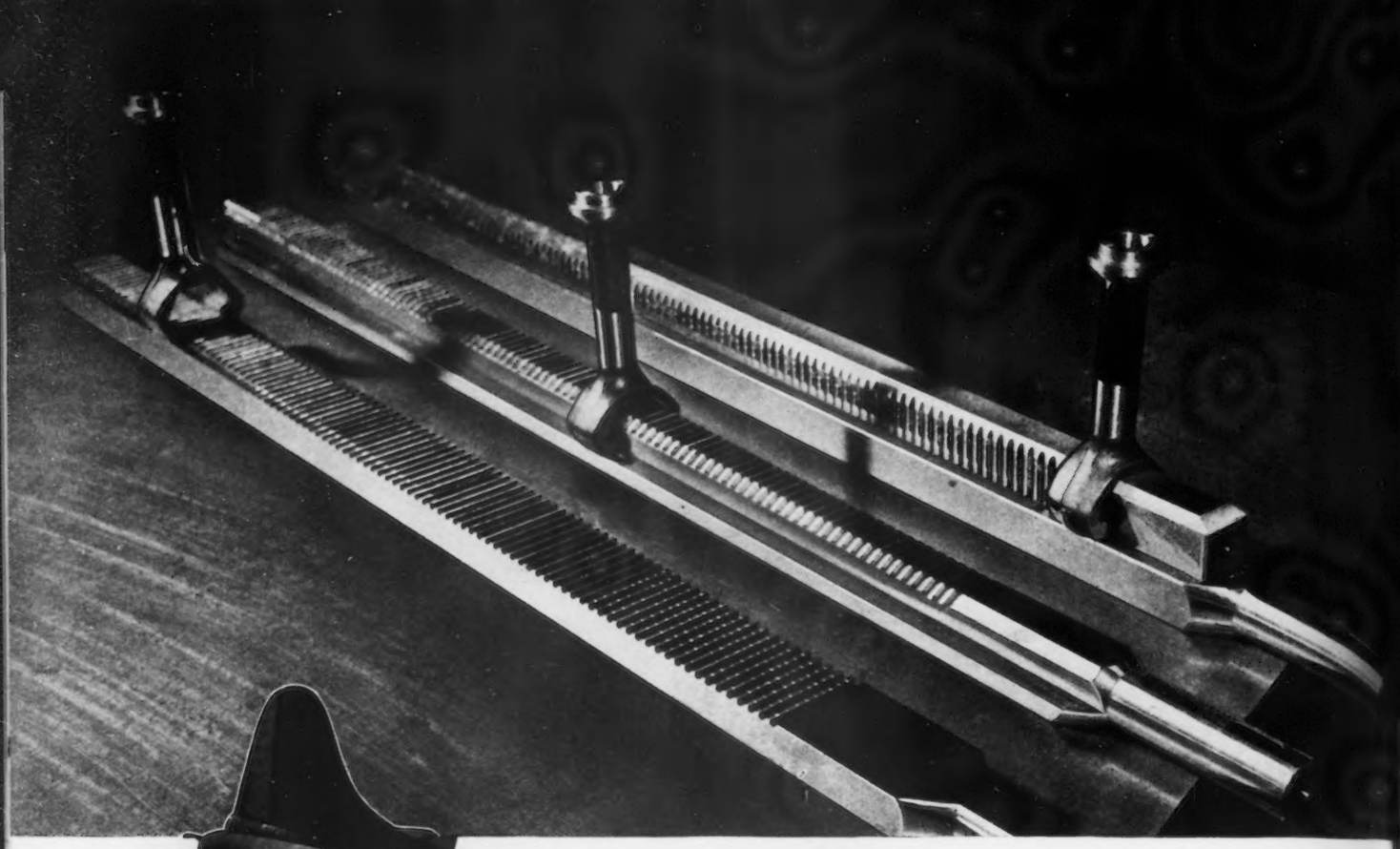


Boeing Flying Fortresses — the planes that are proving their deadliness so spectacularly by successful operations in the southwest Pacific and other war areas — are now being built by quantity production methods. One of the many high speed operations in the Boeing plant is that of broaching the jaws of steel forgings, using the three broaches shown above and the Lapointe Horizontal Hydraulic Broaching Machine shown at the right.

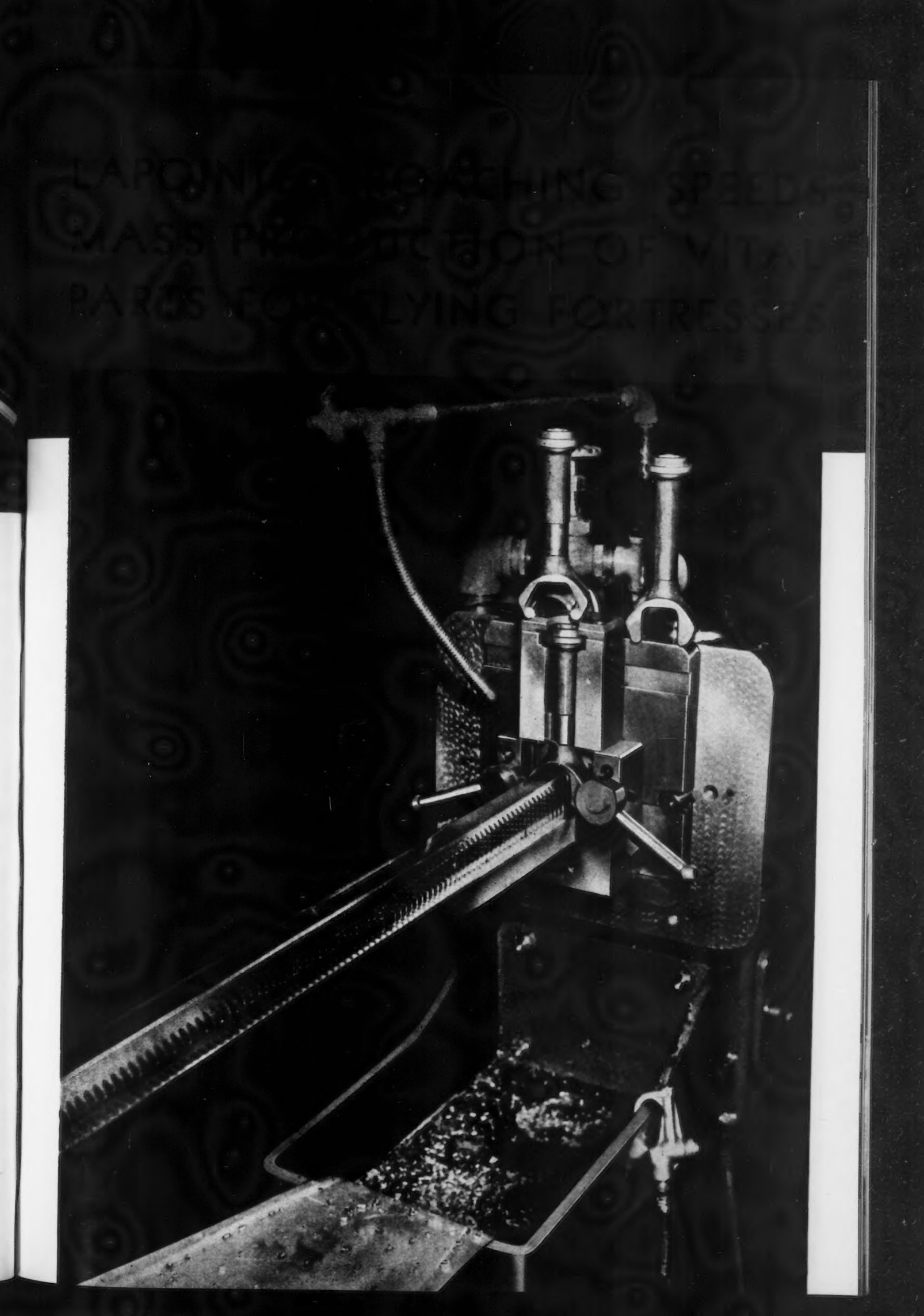
Aircraft engine manufacturers, builders of bombers and pursuit planes, manufacturers of ordnance of all types are turning to Lapointe broaching to speed up precision operations on the intricate contours of many vital parts. There are Lapointe Broaching Machines to handle parts of all sizes, from small pistol barrels to anti-aircraft gun breech blocks weighing over 1000 pounds.

Speed is the vital factor in today's war production — speed plus the accuracy that is necessary for the unfailing performance of guns, warships and planes. Let us show you how broaching methods, speeded up, modernized and made more accurate by Lapointe engineers, can help you put your war production on a more efficient basis.

LAPOINTE

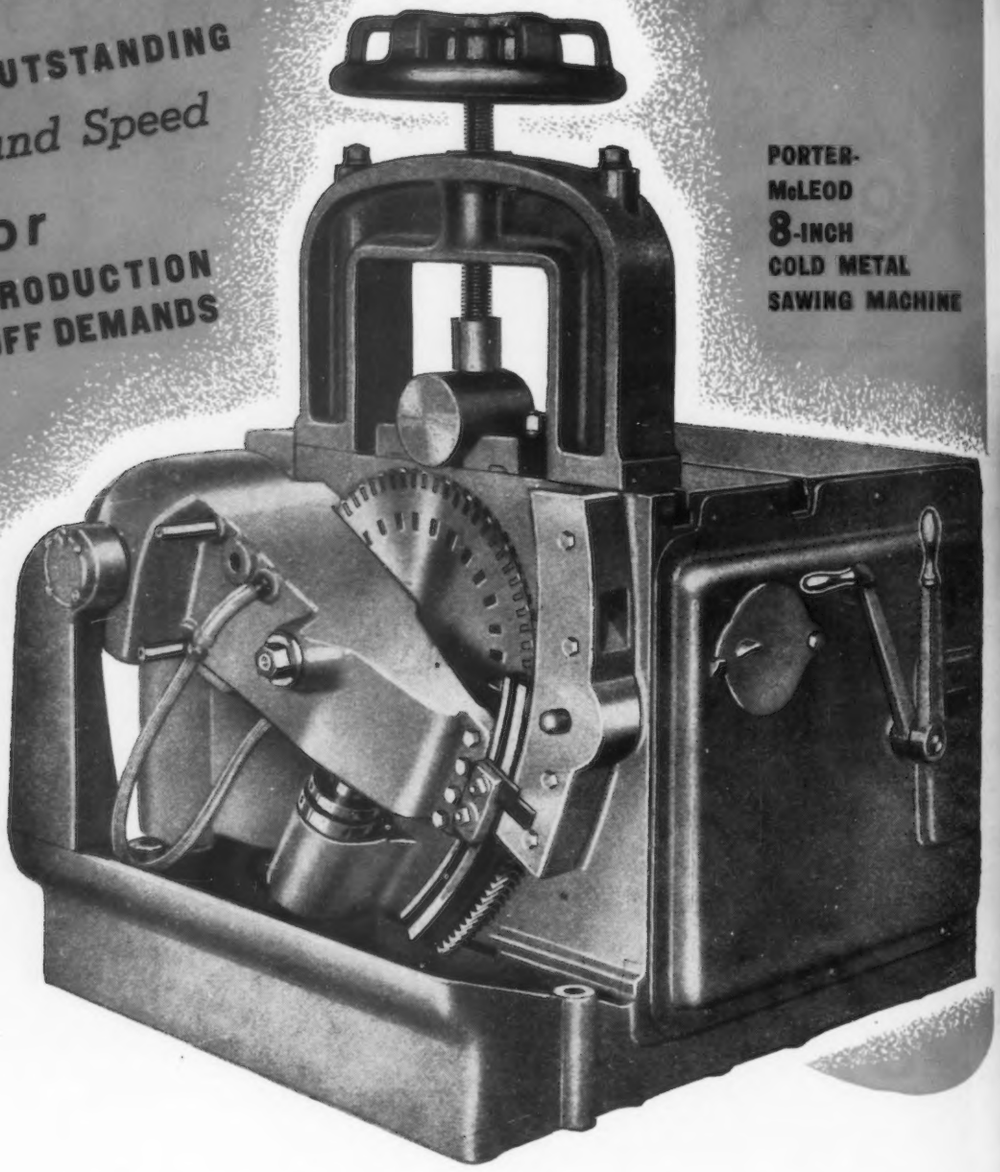
MACHINE TOOL COMPANY

HUDSON, MASS.



PROVIDING OUTSTANDING
Capacity and Speed
for
TODAY'S PRODUCTION
CUTTING-OFF DEMANDS

PORTER-
McLEOD
8-INCH
COLD METAL
SAWING MACHINE



MACHINE TOOL COMPANY

Cold metal sawing is being put on a true production basis by this new PORTER-McLEOD development. Ability to cut stock from 3 inches up as well as nest bars or shapes for multiple cutting, together with a Standard 3" per minute feed assures time savings in cutting-off operations which take the bottleneck out of cold metal sawing operations. In addition, greater accuracy and lower cutting costs are assured.

With the PORTER-McLEOD, straight cuts in stock at high speed are guaranteed. This advantage is attained by the unique method employed of pulling the blade upward through the stock and at the same time supporting the blade close up to its rim thereby preventing buckling and weaving. Friction disc feed further insures against blade damage particularly when cutting encounters hard spots.

With every tooth of the PORTER-McLEOD saw making cuts, production can be greatly stepped up. If you have a cutting-off problem, now's the time to investigate the assured savings you can make in time, power and maintenance.

Write today for illustrated Bulletin giving full details of this production cutting-off machine.

PORTER-McLEOD MACHINE TOOL CO., INC.
HATFIELD, MASS., U.S.A.

INDUSTRY'S "BALL OF FIRE"

FIRTHITE

T-16

TUNGSTEN-TITANIUM CARBIDE

TITANIUM is responsible for Firthite T-16's brilliant record in the light, rapid finishing of high-strength steels used in aircraft, tanks, and other mechanized equipment and materiel.

Inclusion of **TITANIUM** in the composition of ALL Firthite steel-cutting grades has stepped up the speed, improved the finish and accuracy of the work, increased the number of pieces between grinds.

TITANIUM is very plentiful and inexpensive. Firthite tips containing this amazing ingredient are now priced lower than ever before, because greater demand and volume production have made possible lower processing costs.

In addition to the steel-cutting grades (T-16, TA, and T-04—all with Titanium), **FIRTHITE** is made in Grades HA, H, and HC for speedy machining of cast iron, non-ferrous metals, and non-metallic compositions.

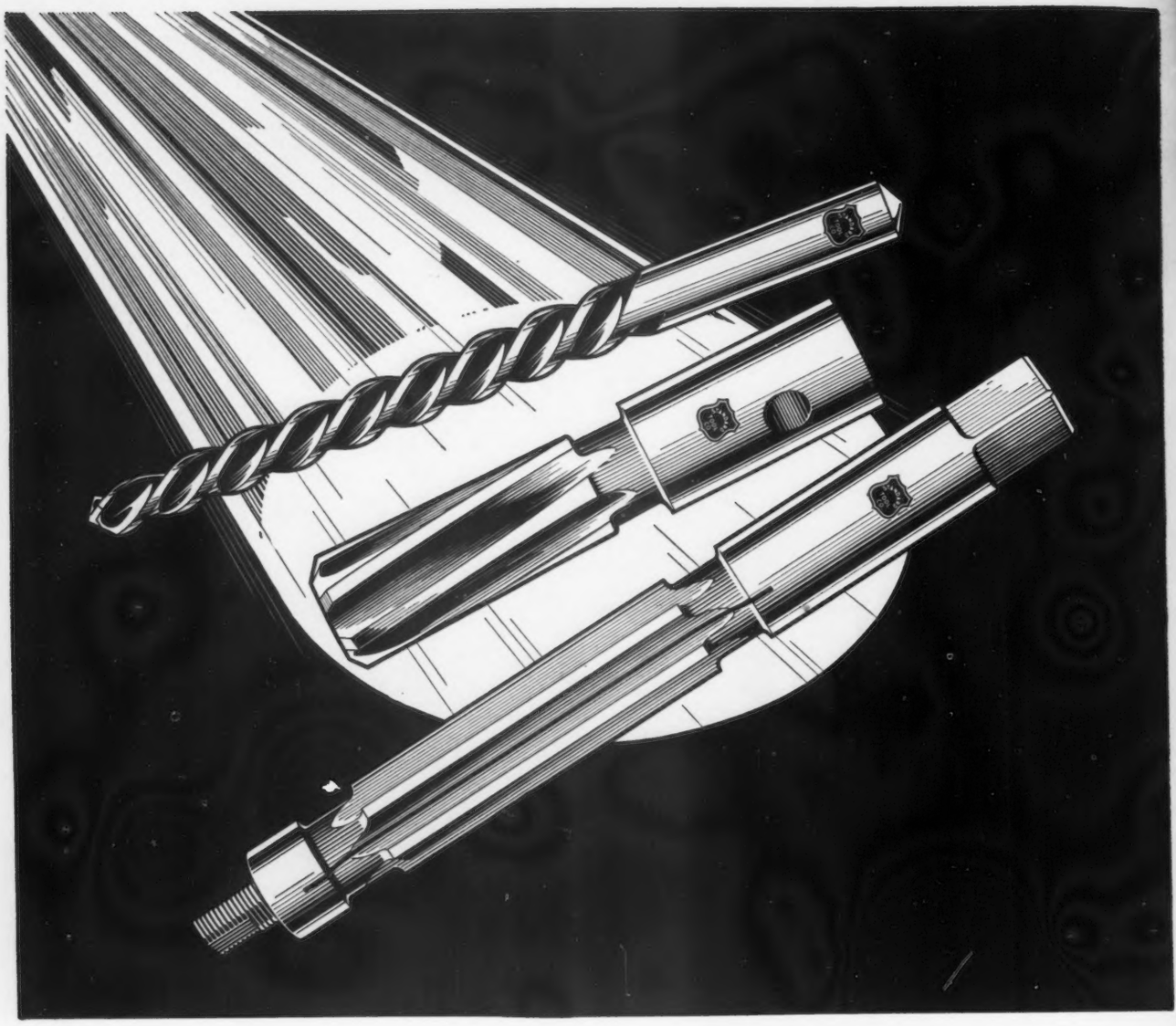
WITH FIRTHITE T-16 YOU CAN PRODUCE—"ENOUGH—ON TIME!"

1. **THE** grade for fine, exceptionally fast facing, boring, and turning to close limits where sustained accuracy is essential.
2. **THE** grade for producing smooth, highly burnished surface on work.
3. **THE GRADE FOR "HYPER-MILLING"** (see Firthite Engineering Bulletin No. FE-106 on this new process).
4. **THE** grade for use on modern, high-speed, high-powered, rigid machines.
5. **THE hardest** standard steel-cutting grade . . . best "wear-resister" for finishing hardest, heat-treated alloy steels.

Firth-Sterling

STEEL COMPANY

OFFICES McKEESPORT, PA. NEW YORK HARTFORD LOS ANGELES CLEVELAND CHICAGO PHILADELPHIA DAYTON DETROIT

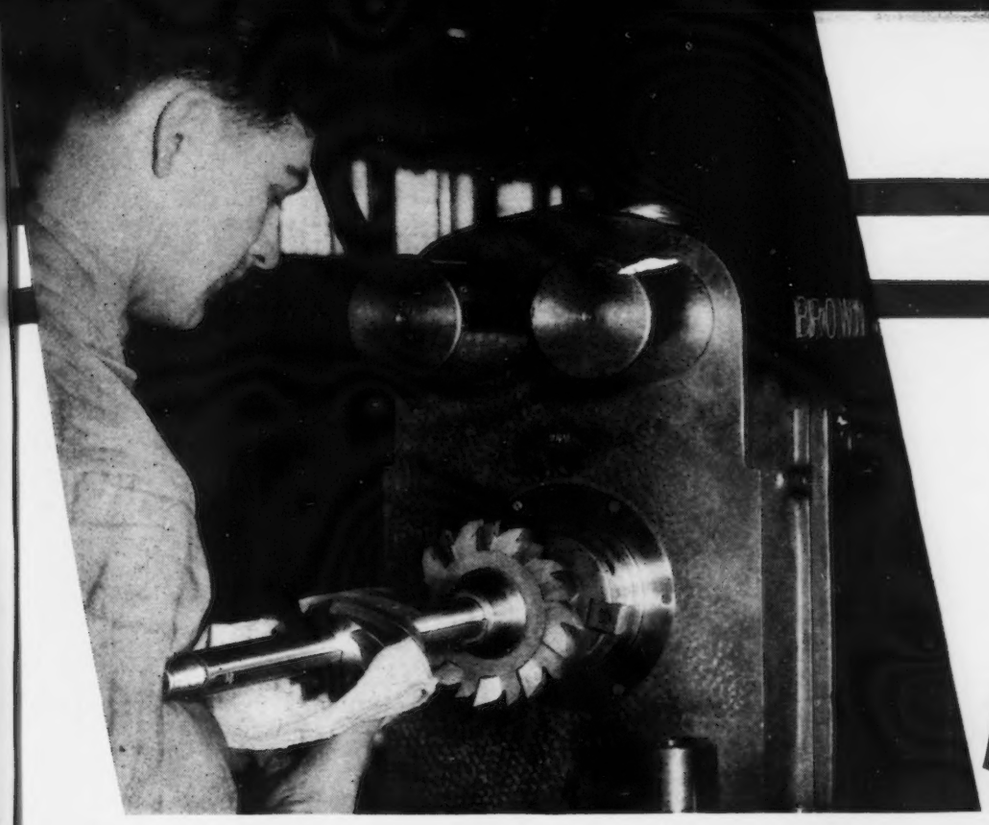


Twist Drills · Milling Cutters
Taps · Dies · Reamers · Drill Chucks
Wheel Dressers · Special Tools

THE STANDARD TOOL CO.

CLEVELAND

NEW YORK • DETROIT • CHICAGO



. . . GET MORE OUT OF YOUR CUTTERS

Cutters must do a greater day's work than ever before. Only a limited supply is available to serve the demands of increasing production.

You can help by using more care than usual with your cutters. By following the suggestions here to get the utmost production from the cutters you use, you can help to do your share in our united war effort.

✔CHECK THESE POINTS

Chatter is a serious cause of poor finish, and damage to cutters. Too much tooth clearance and lack of rigidity of the machine or cutter drive are contributing factors causing chatter.

Mount cutter as close as practicable to the spindle.

With small cutters (such as end mills) be sure to run at the same surface feet as required for larger cutters.

Handle cutters carefully. Prevent damage to the cutting edges.

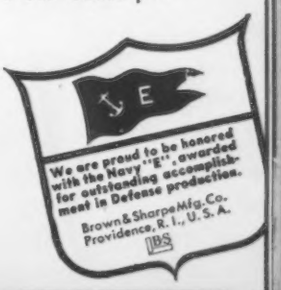
Watch cutters for wear. When dulling becomes excessive, too much metal is removed in the sharpening process. On a production job, sharpen the cutters after a predetermined number of cuts regardless of wear.

✔CHECK THE MACHINE Be sure machine is heavy enough to stand the cut—and in good condition • Use the correct spindle speeds with each setup • If coolant is needed, use enough.

✔CHECK THE ARBOR Use arbors of ample diameter • Insert shanks of arbors carefully in thoroughly-cleaned taper holes • Be sure ends of collars are not bruised • Provide adequate arbor support.

✔CHECK THE WORK Have the work clamped and supported properly • Work not rigidly held can cause premature cutter wear or even breakage.

Help the war effort—get the utmost in productivity and service from these critically needed cutting tools.


E
We are proud to be honored with the Navy "E", awarded for outstanding accomplishment in Defense production.
Brown & Sharpe Mfg. Co.
Providence, R. I., U. S. A.
BS

Reprints of this advertisement for use on your bulletin board furnished on request.

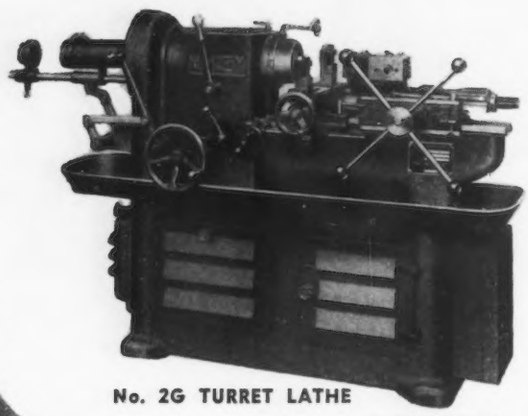
BROWN & SHARPE CUTTERS

MOREY

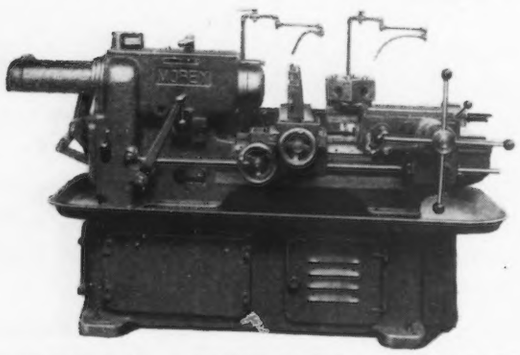
VERTICAL SHAPER 8"-12"-14" STROKE

is proud of the fine showing that has been made by these machines and the enthusiastic unsolicited testimonials received from decidedly satisfied users. Wherever Morey machines are used they are helping keep and better the most drastic production schedules. Get the full details of what these machines can do. Have our representative call.

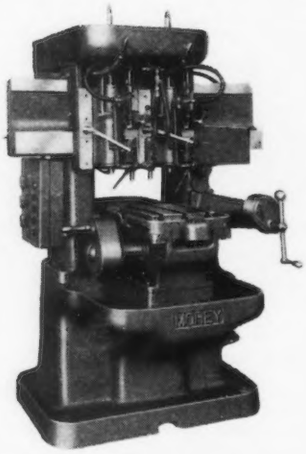
MOREY MACHINERY CO., INC.
410 BROOME STREET • NEW YORK, N. Y.



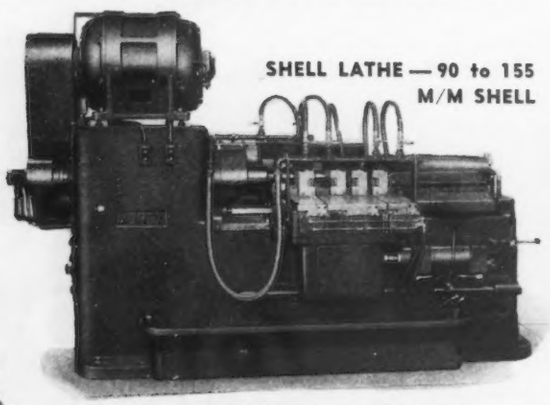
No. 2G TURRET LATHE
1" CAPACITY



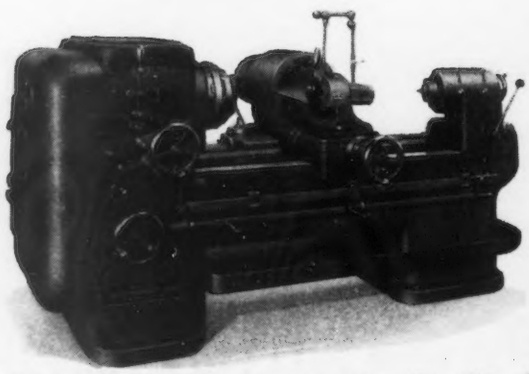
UNIVERSAL No. 3 TURRET LATHE — 1½" CAPACITY



PROFILER No. 12M SINGLE AND DOUBLE SPINDLE



SHELL LATHE — 90 to 155 M/M SHELL

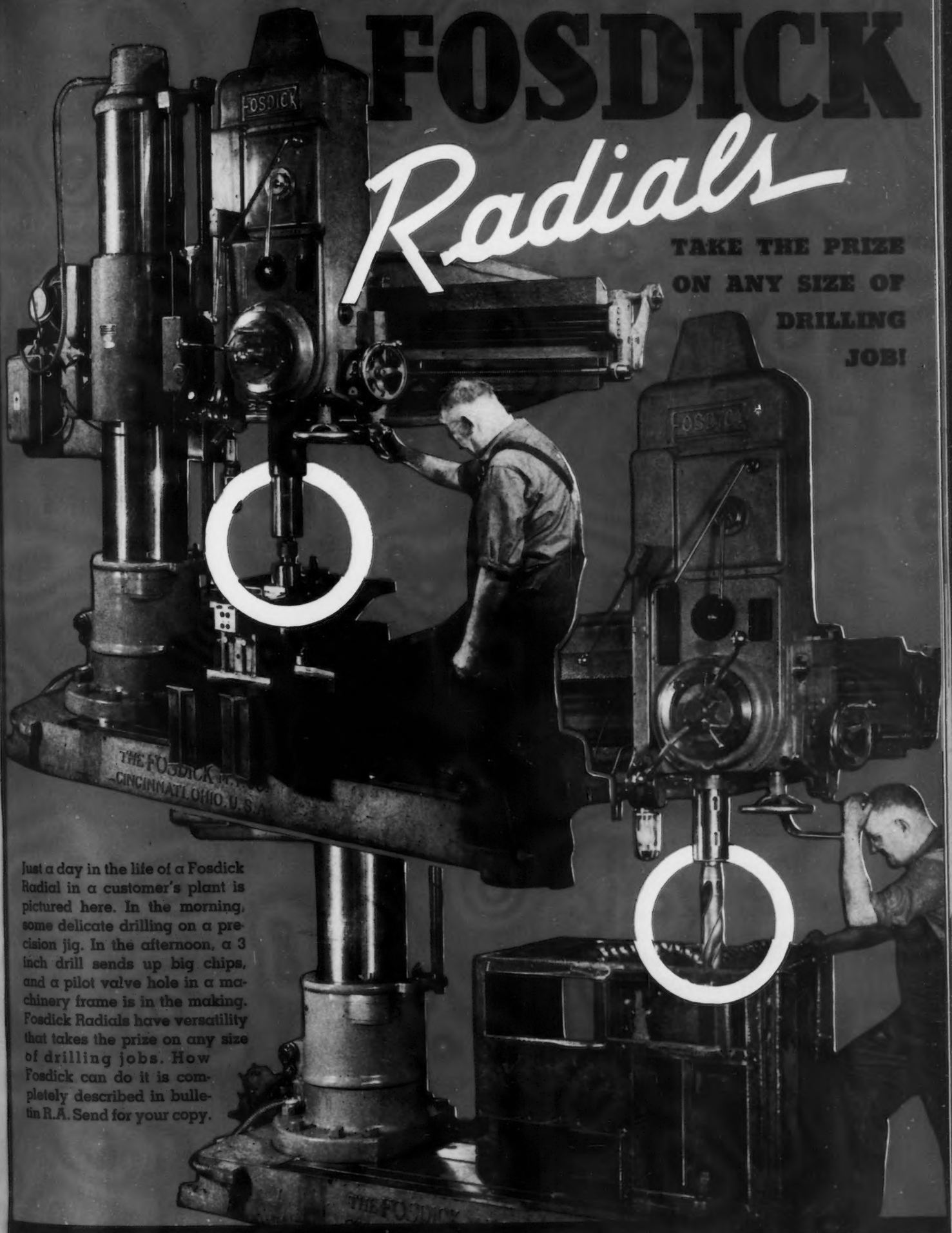


THREAD MILLER—12" x 30"—12" x 60"—12" x 90"
12" x 120"

FOSDICK

Radials

TAKE THE PRIZE ON ANY SIZE OF DRILLING JOB!



Just a day in the life of a Fosdick Radial in a customer's plant is pictured here. In the morning, some delicate drilling on a precision jig. In the afternoon, a 3 inch drill sends up big chips, and a pilot valve hole in a machinery frame is in the making. Fosdick Radials have versatility that takes the prize on any size of drilling jobs. How Fosdick can do it is completely described in bulletin R.A. Send for your copy.

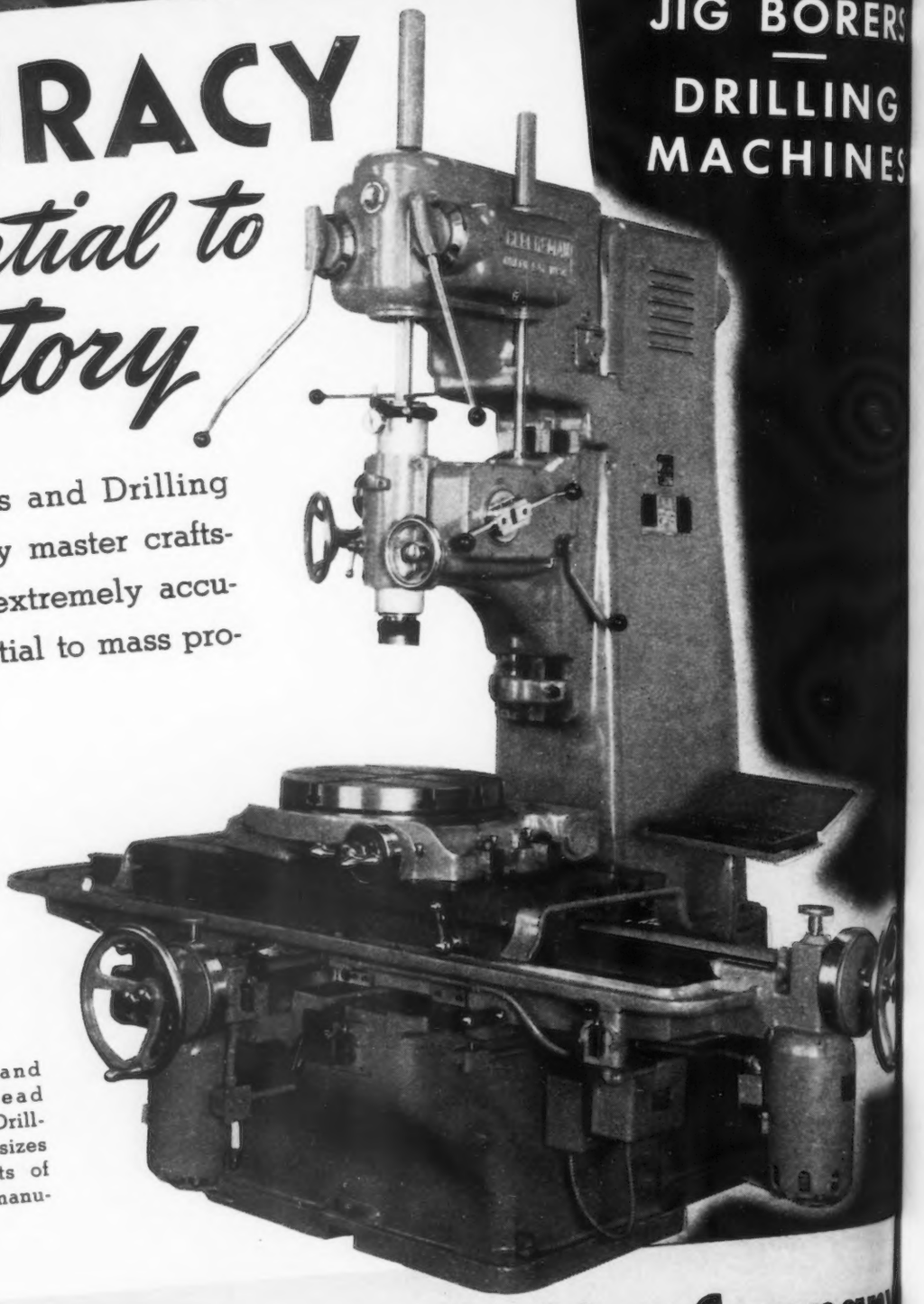
FOSDICK MACHINE TOOL COMPANY
CINCINNATI ••• OHIO

CLEEREMAN

JIG BORERS
—
DRILLING
MACHINES

ACCURACY
– essential to Victory

Cleereman Jig Borers and Drilling Machines are built by master craftsmen to perform the extremely accurate machining essential to mass production for victory.



★

Cleereman Jig Borers and *Cleereman* Sliding Head Round, and Box Column Drilling Machines are built in sizes to meet the requirements of tool rooms and general manufacturing shops.

Bryant Machinery & Engineering Company

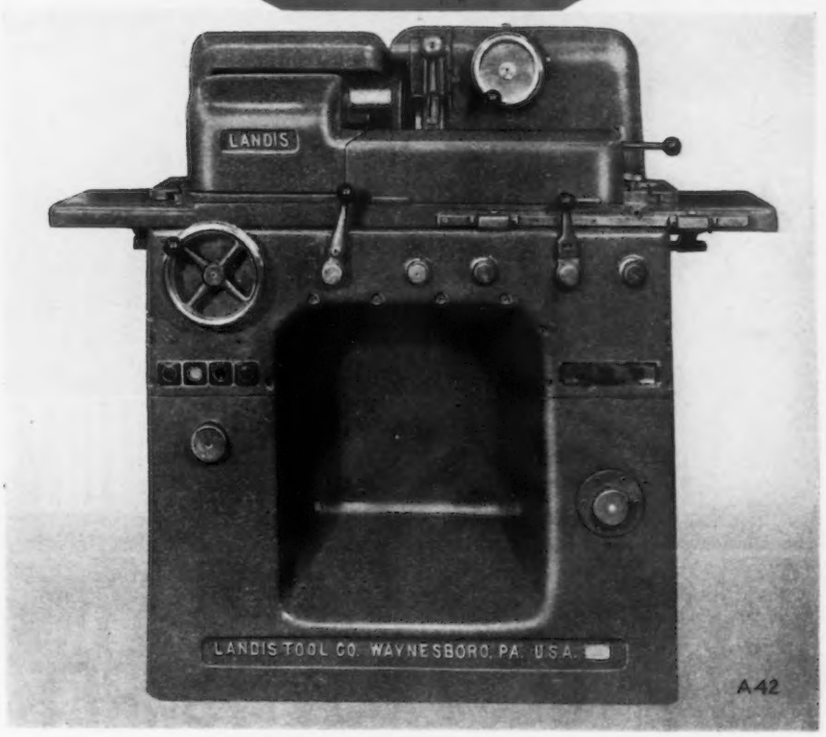
Sales Division of **Cleereman Machine Tool Co.**

400 W. Madison St. . . Chicago • Ill. • U. S. A.

TO FINISH THE JOB QUICKER . . .

THIS LANDIS PERFORMS

4300 OPERATIONS IN 10½ HOURS



PRECISION LANDIS GRINDERS

Unusual Performance As Usual

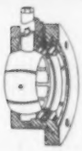
Are top manufacturers working at top speed? Just ask any of them and the answer will be a loud "YES".

If you ask a certain one, he will in addition undoubtedly point out the manner in which Landis 4" Type H Plain Hydraulic Grinders are helping meet the abnormal demands for his product. One of these machines is actually performing 4300 operations in 10½ hours. This, we submit, is a quite unusual record.

No grinder not properly designed and skillfully handled could even approach such productiveness. The Landis Type H has what it takes, as evidenced by performance in this plant and in many others. Are you certain that you have what it takes in your Grinding Department to turn out the smaller parts at the rate demanded today? If not, try the Type H.

LANDIS TOOL CO. WAYNESBORO, PENNSYLVANIA.

VARIABLE VOLTAGE HEADSTOCK.



MICROSPHERE WHEEL SPINDLE BEARINGS.

MICROMETER WHEEL FEED.

400

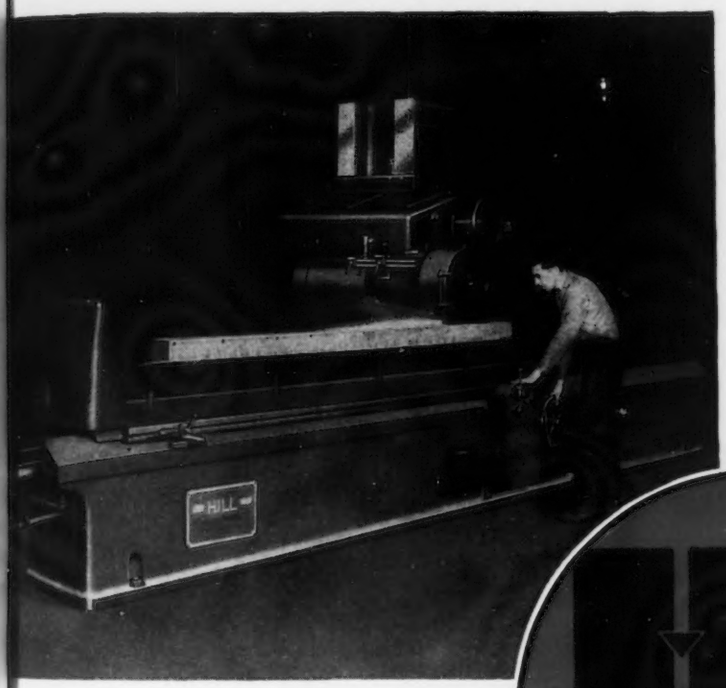
AS APPLIED TO A LIBBY TURRET LATHE

1. "LOGAN" Model 5022 Hydraulic Power Unit
2. "LOGAN" Reducing Valve
3. "LOGAN" Model "HR" Hydraulic Cylinder
4. "LOGAN" Model 4095 Control Valve
5. "LOGAN" 3-Jaw Chuck

This Libby Turret Lathe, manufactured by the International Machine Tool Corporation, is equipped with a "LOGAN" Hydraulic Power Unit as an entirely independent source of fluid power supply, which assures constant pressure for the continuous and efficient operation of the "LOGAN" Hydraulic Cylinder. A Rotating Type "LOGAN" Hydraulic Cylinder actuates a "LOGAN" 3-Jaw American Standard Chuck. For controlling the action of the hydraulic cylinder, a "LOGAN" 4095 Balanced Four Way Piston Type, Hand Operated Valve is used. "LOGAN" Representatives and "LOGAN" Engineers will be glad to make recommendations on your hydraulic problems.

LOGANSPORT MACHINE, INCORPORATED
914 PAYSON ROAD LOGANSPORT, INDIANA
Manufacturers of Air and Hydraulic Devices, Chucks, Cylinders, Valves, Presses and Accessories

Reaching PRODUCTION GOALS with HILL "open side" HYDRAULIC SURFACE GRINDERS



Unusual production increases reported by users of HILL *"Open Side"* Hydraulic Surfarce Grinders are attributable to the fact that HILL Grinders are *designed* and *built* for continuous heavy duty grinding. • Available in both Horizontal and Vertical Spindle types, these *companion* Grinders cover an extensive range of applications. • Manufactured in table widths 18", 24", 30" and 36" in the Horizontal Spindle type, and 18", 24" and 30" in Vertical Spindle type. Table lengths range from 5 to 20 feet.

★ ★ ★ ★ ★ ★

Featuring

Massive Construction, "Open Side" Convenience, 100% Hydraulic Drive, Centralized Controls *and* Permanent Accuracy

The HILL ACME Co.

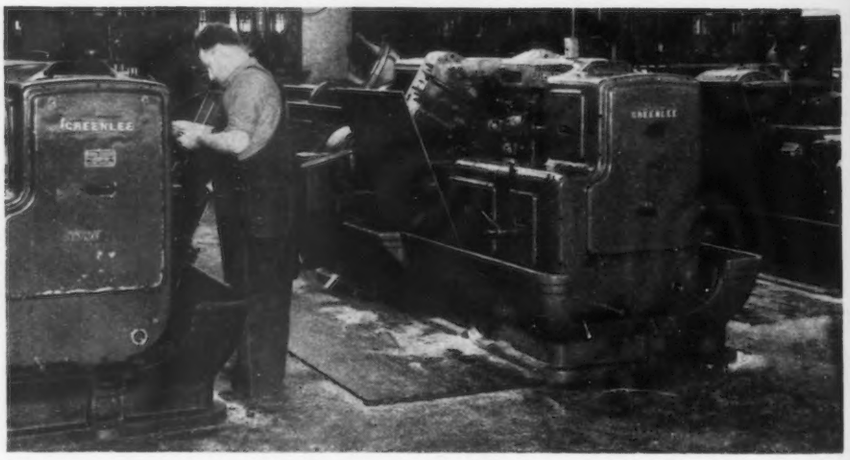
6400 BREAKWATER AVE • CLEVELAND, OHIO

Greenlee AUTOMATIC NEWS

PREPARED BY GREENLEE BROS. & CO., ROCKFORD, ILL.

14 PRACTICAL SUGGESTIONS FOR THE INEXPERIENCED SCREW MACHINE OPERATOR

To Help Reduce Down Time and Speed Up Production



Today the hundreds of Greenlee Automatic Screw Machines now at work turning out shells, gun parts, aircraft parts, and other essential war parts, are in many cases being run by new inexperienced operators. To help make their job easier and to help them save vital production minutes and reduce lost down time, here are 14 practical operating tips.

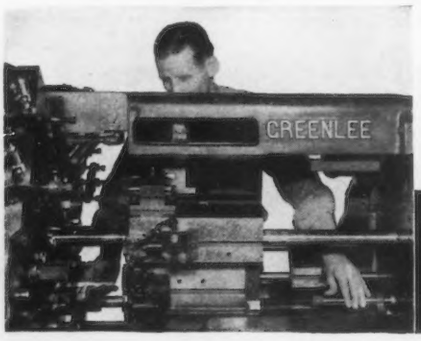
1. When it is necessary to make an adjustment on the cross slide tools of .004 or more on a side, it should be done by moving the tool rather than by using the compensating stops on the cross slide. The continued misuse of the compensating stops as a means of adjusting tools sets up undue tension and strain on the cross slide arm resulting in possible crystallization and breakage of the arm.

2. Do not stop machine with stock against stock stop. The turning of the stock against the stop will cause burring of the stop.

3. When locking the collets use only the hand lever. The tension should never be so great as to require the use of additional leverage.

4. The machine should never be put in feed until ample supply of cutting oil is flowing on the tools.

5. Use only a sufficient number of cam strips to assure the feed out necessary to suit the length of job plus approximately 1 strip to allow for slippage.



6. The main tool slide gib and the cross slide gibs should not be adjusted so tight as to prevent free movement. Check the adjustment of the main tool slide gib by cranking tool slide back and forth to be sure that it moves freely. The cross slide gib adjustment should also be checked by using the hand lever.

7. In setting up the machine be sure that the stock stop is adjusted properly. The desired length of feed out should be measured from the face of the stock stop to the cut-off blade with scale as illustrated in the photograph below.

8. All bars of stock should be wiped clean and ground on the front end to eliminate any burs before being put into the machine. Forcing stock with burs into collets puts too much of a strain on the pushers which may break or spread them, destroying the proper tension and resulting in excessive slippage.

9. Set the feed tube safety plate about 1/16" from end of feed tube spool when the roller is at high point on the feed out cams. If this safety plate is not properly set, the spool will run back of the feed out shoe and stick the machine at half index.

10. Never put over .005 to .006 tension on the main tool slide stop screw. Too much tension will cause safety clutch to slip, resulting in loss of production time.

11. Be sure that tools are clamped tight in tool holders and that the contact surfaces of the tool holders are free from dirt or chips.

12. When encountering any difficulty in deep drilling of small holes, a slight burr of .0001" or .0002" in height, raised by use of a fine stone on the land of the drill, will keep the drill from binding.

13. Motor should never be shut off when tools are engaged until machine has been thrown out of feed or tools may break due to excessive strain.

14. A very important factor in obtaining maximum screw machine efficiency is the thorough cleaning and oiling of the machine at frequent intervals. These periodic cleanings will eliminate the fine settlings and sludge which can prove so injurious to the coolant pump, the collets and closing sleeves, and the other working parts of the machine.

MULTIPLE-SPINDLE DRILLING, BORING AND TAPPING MACHINES

Greenlee BROS. & CO. ROCKFORD ILLINOIS U.S.A.

AUTOMATIC SCREW MACHINES
AIRCRAFT PRODUCTION MACHINERY

A Powerful Line of GUSHER COOLANT PUMPS for War Production

Model 1-P2, 1/10 HP, immersed type.

Model 11024, flange-mounted type with external discharge.

The success of any powerful war machine depends to an enormous degree upon a continuous line of supplies. To a similar degree the modern machine tool depends for its success upon a continuous supply of coolant. Ruthman pumps are noted for delivering a continuous supply of coolant from a trickle to a gusher at the mere snap of a switch, year in and year out with no time out for repairs. No packing to fuss with; no need for priming; no clogging up with grit. A truly great pump for all machine tools. Is used as standard equipment by a great many important builders of machine tools. Can also be obtained in tank units which are complete circulating outfits to be used on machines not originally equipped with pumps or reservoirs. These tank units can also be used as utility pumps in an emergency. Write now for complete details.

Model 11023-A, 1/5 HP, immersed type.

Model 11070-A, flange-mounted type with discharge through base of shell.

The RUTHMAN Machinery Company

CINCINNATI, OHIO, U.S.A.

Model 11023-E, flange-mounted type with internal discharge through reservoir.

Model 1-P2 short, 1/10 HP, in 4 gallon oil tank.

Model UL, immersed type with adjustable flow control and bracket mount.

SPEED AND PRECISION

OFFICIAL U. S. NAVY PHOTOGRAPH

START HERE

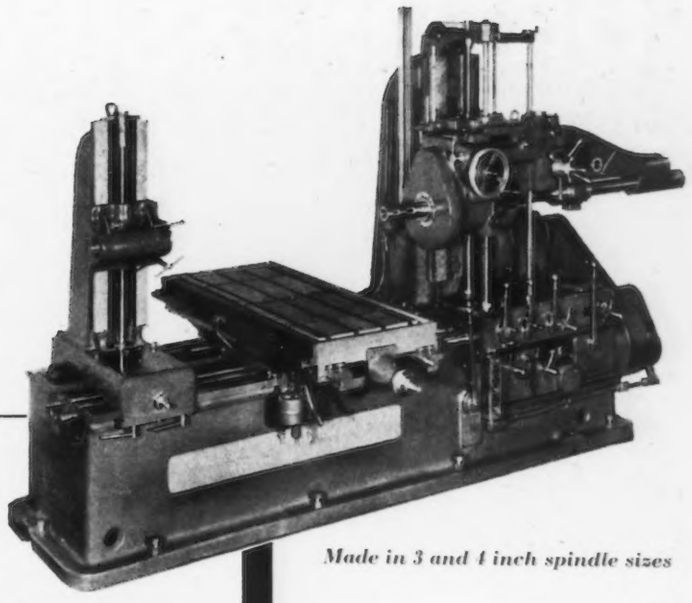
GRINDING A SPIRAL BEVEL AIRCRAFT PINION ON A NO. 17 HYPOID GRINDER

GLEASON

GLEASON WORKS

Builders of Bevel Gear Machinery for Over Seventy-five Years

1000 UNIVERSITY AVENUE, ROCHESTER, N. Y., U. S. A.



Made in 3 and 4 inch spindle sizes

UNIVERSAL

BORING MACHINE FEATURES INSURE PRODUCTIVE CAPACITY ...WITH SUSTAINED ACCURACY

This improved machine—available in three- and four-inch spindle sizes—with the "TRI-WAY" bed developed by Universal—handles boring operations with utmost precision under high production demands.

Design is such that there are no overhanging parts, all units being directly mounted on a deep box type base—a feature that insures utmost stability and rigidity.

The head assembly is of unit design with spindle carrier cast integral with main body of head. Correct spindle elevation is maintained by one long adjustable tapered gib. Back gears and spindle feed reducing gears are located in the head.

Limit trips prevent over travel of table in either direction. An improved method of saddle clamping operates from front of the saddle locks both front and rear. Table clamping is handled from the front of machine. Feed and speed units are mounted in bed without overhang.

Rapid traverse is provided in both directions to all units through a multiple disc clutch which disengages automatically when operator removes his hand from control lever. Feed and rapid traverse cannot be engaged at the same time.

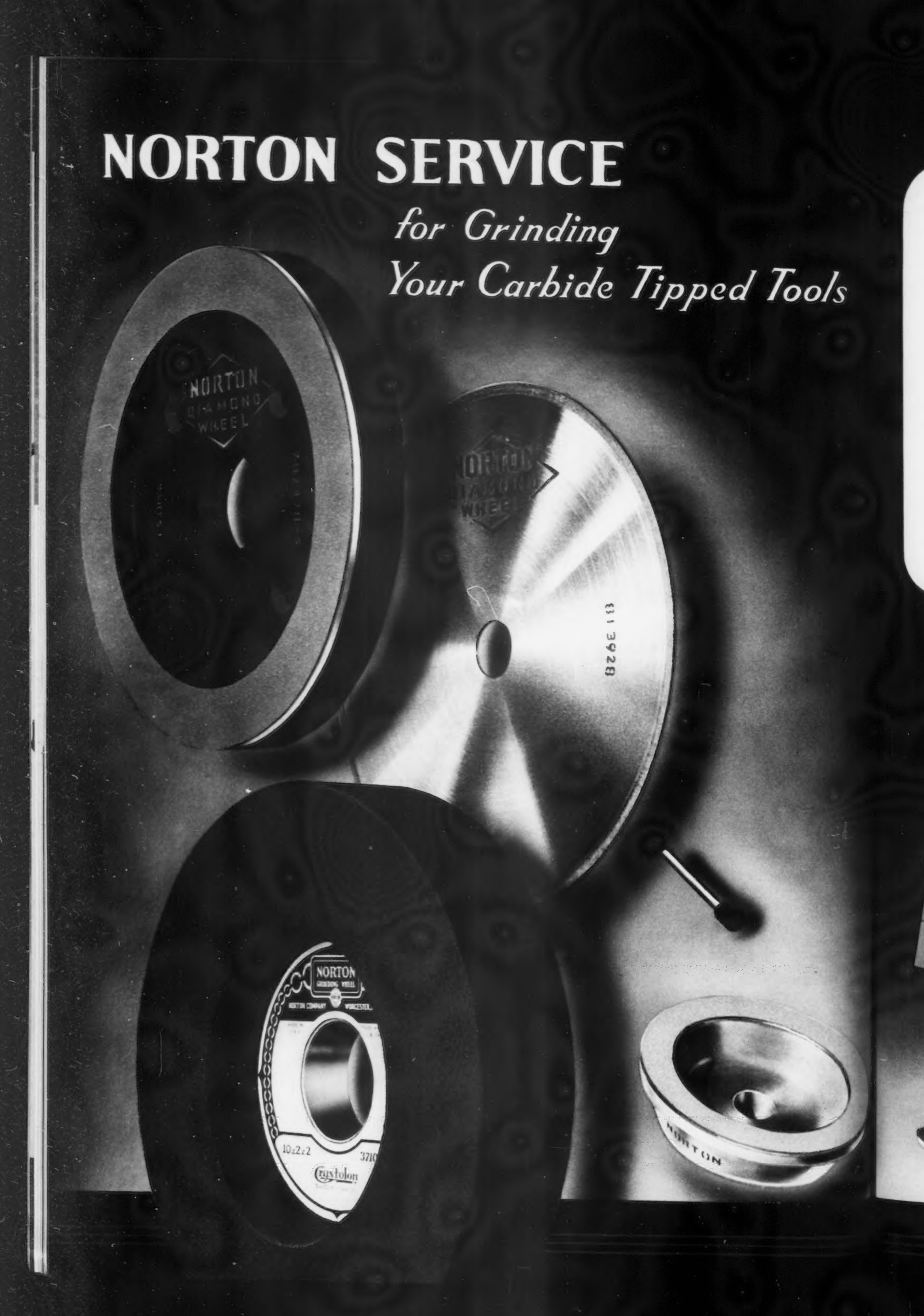
1. Three Bed Ways.
2. Table Semi-Box design, heavily ribbed.
3. Motor mounted directly on base.
4. Saddle lead screw nut mounted between guiding ways.
5. Centralized right hand control.
6. Heavy duty type — heaviest 4" spindle machine built.
7. One shot lubrication for head; also for saddle and table assembly.

UNIVERSAL BORING MACHINE CO.

HUDSON, MASS., U. S. A.

NORTON SERVICE

for Grinding
Your Carbide Tipped Tools



There are three types of Norton wheels used for grinding the cemented carbides. Each has its field. For example: *metal bonded diamond wheels* for the off-hand grinding of single point tools; *resinoid bonded diamond wheels* for sharpening multi-blade tools such as milling cutters; *Crystolon wheels* for many roughing operations.

Norton abrasive engineers are familiar with all three types and their proper application. To obtain their help contact direct or through your Norton distributor.

NORTON COMPANY, WORCESTER, MASS.

Distributors in All Principal Cities

Grinding Wheel Recommendations
FOR CARBIDE TOOLS

Offhand Grinding (Single Point Tools)

Cup Wheels:

Combination roughing and finishing (wet)	120 Diamond Metal Bonded
Roughing (dry)	3760/1-I7 CRYSTOLON vitrified.
Roughing (wet)	100S Diamond Metal Bonded or 100-B25 Diamond Resinoid or 3760/1-J7 CRYSTOLON vitrified.
Finishing (dry)	37100-H7 CRYSTOLON vitrified.
Finishing (wet)	220 Diamond Metal Bonded or 220-B50 Diamond Resinoid Bonded or 37100-H7 CRYSTOLON vitrified.

Straight Wheels:

Roughing (dry)	3760/1-I7 CRYSTOLON vitrified.
Roughing (wet)	3760/1-J7 CRYSTOLON vitrified.

Machine Grinding (Single Point Tools)

Cup Wheels:

Roughing (wet)	3760/1-I7 CRYSTOLON vitrified.
Finishing (wet)	3790/1-H7 CRYSTOLON vitrified.

Straight Wheels:

Roughing and Finishing (wet)	3780/1-J7 CRYSTOLON vitrified.

Chip Breaker Grinding

Straight Wheels:

Roughing and Finishing (wet)	120-B100 Diamond Resinoid Bonded.

Cutter and Reamer Grinding

Cup Wheels:

Bocking Off (Sharpening)	220-B100 Diamond Resinoid Bonded.

Straight Wheels:

Ingersoll Cutter Grinder	120-B100 Diamond Resinoid Bonded (10 x ¼ x 1").

Surface Grinding

Straight Wheels:

Roughing (wet)	100S or 150 Diamond Resinoid Bonded or 3760/1-J7 CRYSTOLON vitrified.
Roughing (dry)	3760/1-I7 CRYSTOLON vitrified.
Finishing (wet)	220 to 400 Diamond Resinoid Bonded, depending upon finish desired or 37100-I7 CRYSTOLON vitrified.
Finishing (dry)	37100-H7 CRYSTOLON vitrified.

Cylindrical Grinding

Roughing (wet)	100S Diamond Resinoid or 3760/1-K7 CRYSTOLON vitrified.
Finishing (wet)	100S to 400 Diamond Resinoid Bonded, depending upon finish desired, or 37100-J7 CRYSTOLON vitrified.

Internal Grinding

100 to 400 Diamond Resinoid, depending upon finish desired (available mounted on spindles in smaller sizes).

Hand Honing or Stoning

Rectangular Stick: 220 or 320 Diamond Resinoid hand hone, or 37280-N CRYSTOLON Stick.

Cutting Off

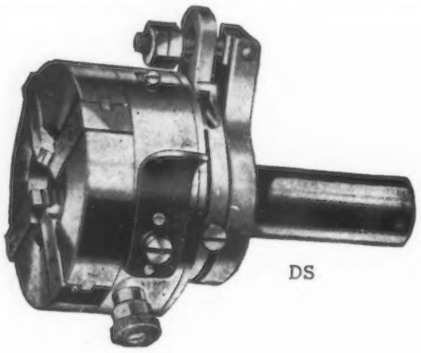
100S or 120 Diamond Metal Bonded for long life; Resinoid Bonded for fast cutting.

You'll find much helpful information in the Norton booklet "Grinding Carbide Tipped Tools"—a complete chapter on the selection and use of each type of wheel. Just ask for Form 167B.

NORTON ABRASIVES

Style DS Die Head for Brown & Sharpe Automatics and similar machines.

Style D Die Head, for Heavy Duty external threading.



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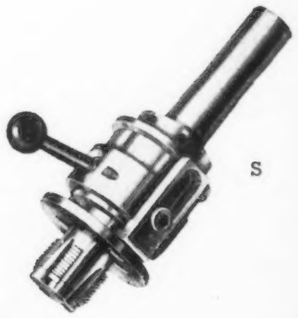

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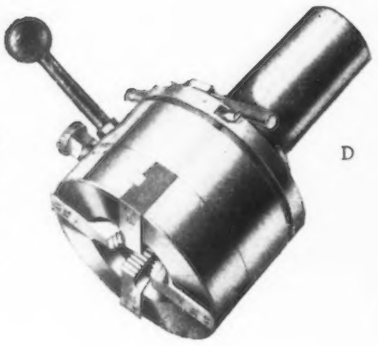

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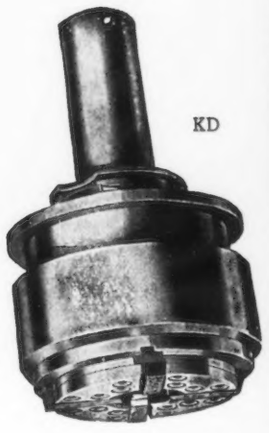


KD

Class S Collapsing Tap, made in a wide range of sizes.

Style KD Rotary—for live spindle machines.

METAL is King!

His scepter swings everywhere. It touches every part of our War Program. Metal alone in both our products and in our people can bring us victory.

In munition plants, automotive and aircraft shops, in every branch of metal working where precision threads must be economically produced at high speeds . . .

GEOMETRIC offers a wide choice of tools which enables you to pick the one just adapted to the work and to the machine on which the work is to be done. Don't use a makeshift tool.

Precision Threading Machines—built in 3 sizes—will cut the N.C. Thread Series up to and including 1" diameter, and National Fine up to and including 1½".

Whether it is internal or external threads, straight or taper threads, specify GEOMETRIC!

With our extensive line and our thorough knowledge of the latest materials and methods, we have taken the kinks out of the knottiest problems. Call on us for help in speeding up, simplifying and cutting costs on threading jobs.

45 years of experience and service to customers tells its own story.

THE GEOMETRIC TOOL CO.

New Haven, Conn.

TWO HEADLINERS

REED-PRENTICE SLIDING GEAR HEAD LATHE

Reed-Prentice toolroom and engine lathes are well-known throughout the entire metal-working industry. Constant improvements in line with Reed-Prentice high standards of engineering and workmanship make the 14", 16", and 20" lathes suitable for your most rigid requirements.

REED-PRENTICE NO. 4 MILLER

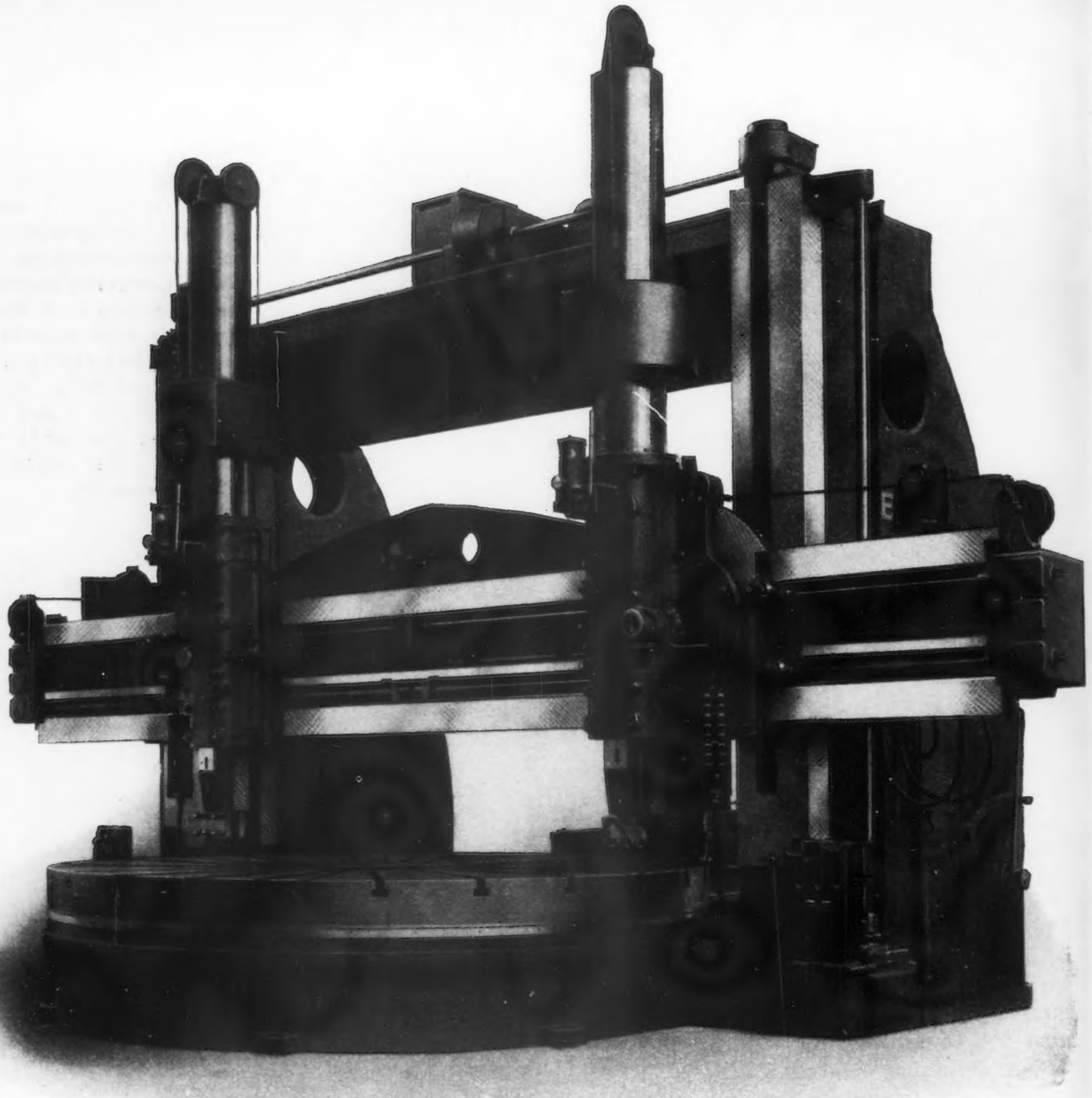
The Reed-Prentice No. 4 Miller is our latest machine tool. Entirely new in design, it features infinitely variable feeds from ½" to 32" per minute. Dependability is insured by hydraulically-driven positive screw feeds to table and cross slide. Centralized control of table, cross slide, and head insure fast and efficient operation.

CATALOGS OF THE COMPLETE REED-PRENTICE LINE WILL BE FURNISHED UPON REQUEST.

REED-PRENTICE CORPORATION ★ MACHINE TOOLS

WORCESTER, MASS. ★ 75 West St., New York City ★ 1213 W. 3rd St., Cleveland, Ohio

★ ★ BETTS VERTICAL BORING AND TURNING MILLS ★ ★



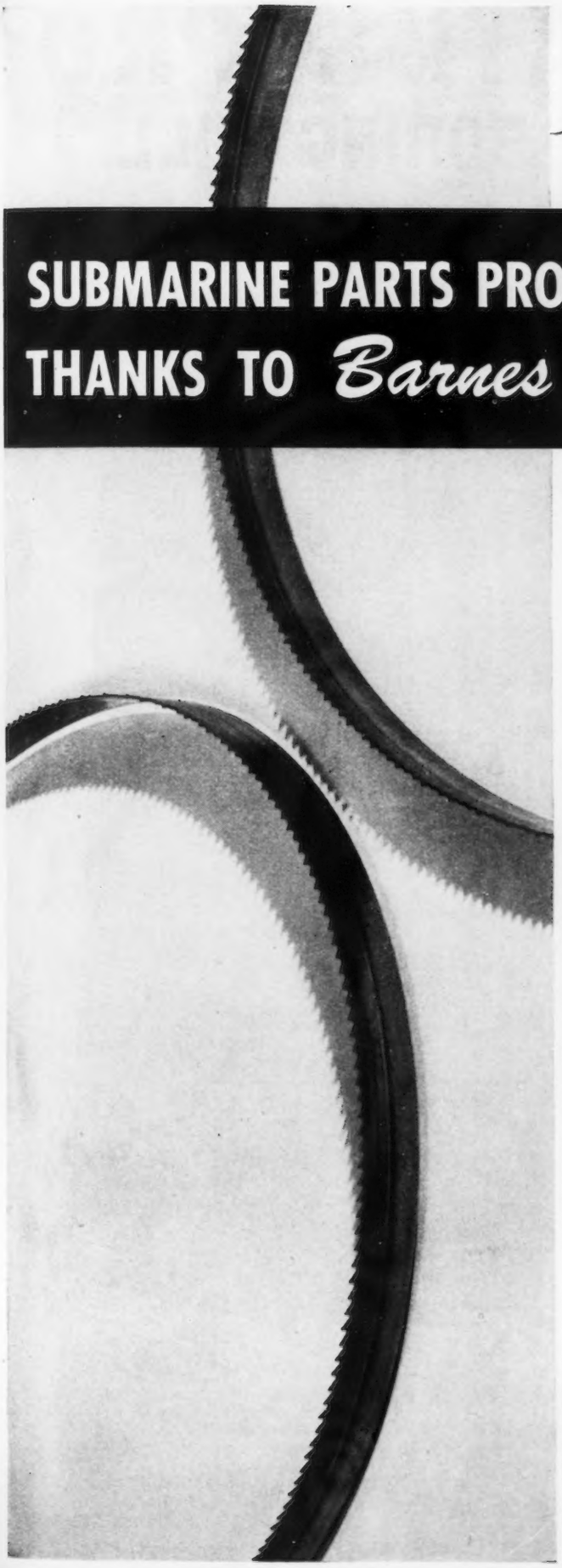
We are building at present a number of 14 ft. and 16 ft. Betts Boring Mills similar in all respects to the machine shown above. These are all on Government orders and are allocated for shipment to industrial plants in accordance with the most urgent requirements.

Many new and exclusive features make them outstanding for the tremendous jobs imposed by our War Program. Operation of these Boring Mills has been simplified. Electrical controls are grouped in portable push button stations, one on each side of the machine. These control stations are shown above, suspended from each head. The machine shown above will swing work 14 ft. in diameter.

BETTS • BETTS-BRIDGEFORD • NEWTON • COLBURN • HILLES & JONES • MODERN

CONSOLIDATED
MACHINE TOOL CORPORATION
ROCHESTER, NEW YORK

SUBMARINE PARTS PRODUCTION SPEEDED... THANKS TO *Barnes "Know How!"*



Cutting fins from a large manganese bronze casting, a well-known Eastern foundry was getting only 30 to 90 minutes from a ¾" — 10 tooth band saw blade.

Poor blade life in this case meant a great deal more than high tool cost. It adversely affected production of a vital submarine part — since each time the blade failed in the cut, an involved set-up operation had to be done over again.

Finally a Barnes man was called in to look at the job. In a few minutes he had diagnosed the trouble; in a half hour it was corrected. Blades at this foundry are now delivering six hours or more of work.

Making blades *work* is as important to Barnes as making them *well*. Barnes blades are recognized in industry for their uniformity.

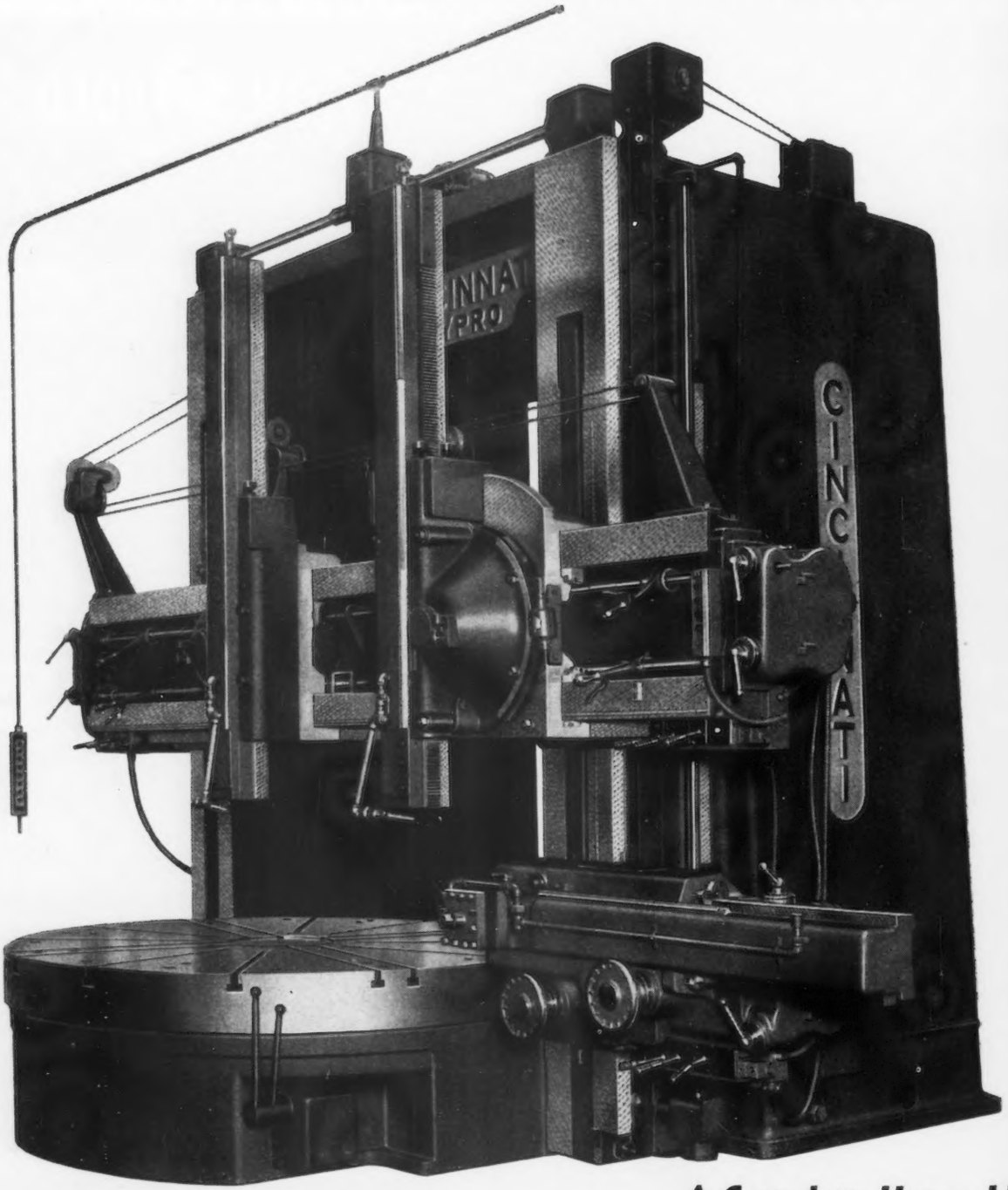
CALL YOUR DISTRIBUTOR

Today your surest, quickest, most complete service for practically any staple industrial product is to be had from your Mill Supplies Distributor. Make a habit of calling him *first* when you need anything. And don't forget to ask for Barnes Blades with your next order.

W. O. BARNES CO. INC.
DETROIT MICHIGAN

A Barnes Blade is Better

CINCINNATI HYPRO
8' VERTICAL BORING MILL



PLANERS · PLANER MILLERS · BORING MILLS

THE CINCINNATI PLANER CO.

CINCINNATI, OHIO

A Complete Hydro Line

CINCINNATI VERTICAL BORING MILLS—54", 64", 6', 7', 7' wid. to 8', 8', 10', 12' and 12'-16' Extension Type.

CINCINNATI OPENSIDE PLANERS—30" to 120".

CINCINNATI DOUBLE HOUSING PLANERS—24" to 120".

CINCINNATI PLANER TYPE MILLERS to 120".

Write for Bulletin 175.

A roll call of shops producing implements of war would find many Potter & Johnston Automatic Chucking Machines turning out accurate duplicate parts and maintaining high production hour after hour, day and night.

And day and night the great Potter & Johnston plant is rushing the building of more and more machines to reinforce those already handling war production.

Every day sees parts in greatly increasing quantities being produced to exacting specifications on P&J Automatic Chucking Equipment—for airplanes, airplane engines, machine guns, anti-aircraft guns, the Bofors gun, the American Oerlikon gun and other emergency needs.

P&J was ready, by long specialized experience, proved equipment and versatility in tooling to meet the demands of vastly stepped-up production.

he POTTER & JOHNSTON MACHINE CO.
WTUCKET . . . . . RHODE ISLAND

GRAND RAPIDS GRINDING

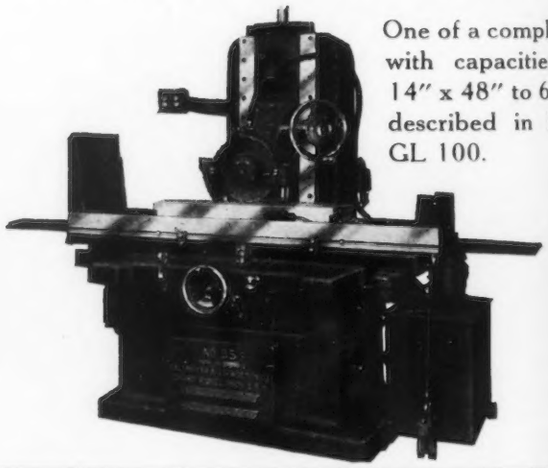
For Longer Lasting Accuracy from Tools and Cutters

Grand Rapids Universal Tool and Cutter Grinders and Drill and Tap Grinders are helping to get longer, more accurate service from all types of tools. Easy to set up, rapid in operation, they enable you to conserve valuable high speed tools, to keep them on the job longer, to maintain high output and consistent accuracy on war production jobs.

For Speed and Precision on Surface Grinding Jobs

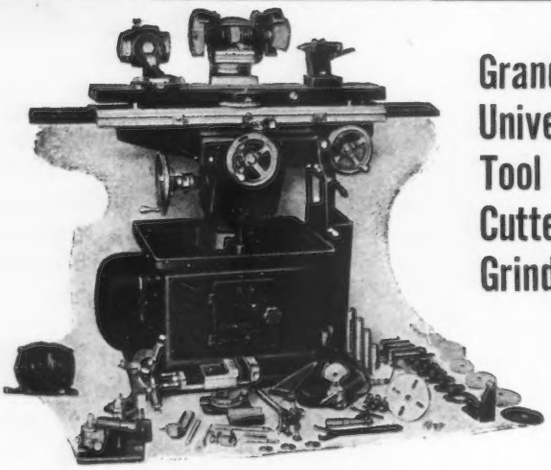
Grand Rapids Hydraulic Feed Precision Surface Grinders are equally capable of fine results on toolroom and manufacturing jobs. Their massive, one piece column and base and precision spindle mounting assure accuracy. Their convenient control features and variable speed hydraulic table feed assure rapidity of operation that has speeded up jobs of war production in every field.

No. 55 Hydraulic Feed Precision Grinder



One of a complete l with capacities fr 14″ x 48″ to 6″ x described in Bull GL 100.

Grand Rapids Universal Tool and Cutter Grinder



Grinds gear cutters, formed cutters, angle cutters, face mills, end mills, side mills, spiral and plain milling cutters, thread chasing tools, reamers, hobs, etc. Performs internal and surface grinding on precision toolroom jobs. Write for full details of this machine—a complete tool sharpening department in itself!

Grand Rapids Drill and Tap Grinder

Automatically grinds correct angles on drills of all sizes, producing a drill point correctly centered with gradually increasing clearance that means faster, more accurate cutting. Quickly set up for grinding all types of taps. Write for descriptive bulletin.

GALLMEYER & LIVINGSTON CO.

200 STRAIGHT AVE., S. W., GRAND RAPIDS, MICH.

WELLS METAL CUT-OFF SAW

SERIES 80

Wells ★★ 80

Wells SAWS
THE SIGN OF SERVICE

SPECIFICATIONS:

Capacity: Rectangle	8" x 16"
(spec. bowed guides)	5" x 24"
Rounds	8" dia.
Speeds: ft. per min.	60, 90, 130
Motor	Specifications are optional

Not a new Cut-Off Saw, but an improved one — a Cut-Off Saw which embodies all the worth while improvements and features a metal cutting saw should possess.

For sixteen years Wells has been occupied with the task of building better saws and here is the latest design — an accurate, durable and economical continuous cutting machine tool.

Base or legs optional.

Write today for full information and specifications.

Wells Has Established Leadership

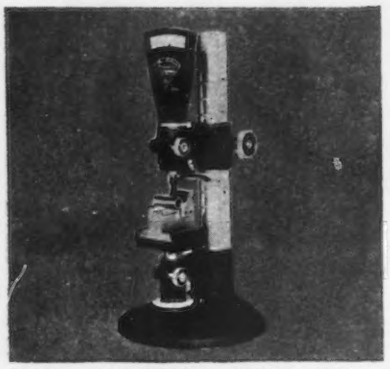
WELLS MANUFACTURING CORPORATION • *Three Rivers, Michigan*

Wells METAL CUTTING BAND SAWS

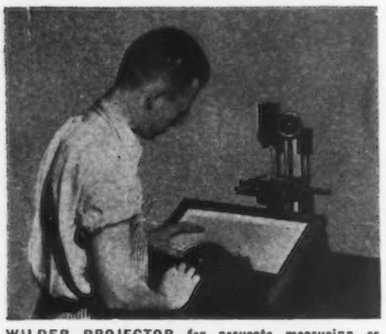
FOR PRODUCTION INSPECTION

OTHER INSTRUMENTS IN THE SCHERR LIMITED BUDGET INSPECTION LABORATORY

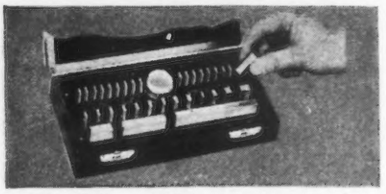
SPENCER BINOCULAR MICROSCOPE, with three dimensional vision, reveals surface finish, imperfections, etc.



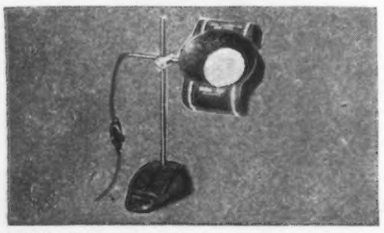
SCHERR COMPARITOL for checking gage blocks, gages and work for size, accuracy and wear.



WILDER PROJECTOR for accurate measuring or comparing objects by means of a magnified shadow image.



ULTRA-CHEX—a 34 block set accurate to .000008" —providing a basic standard of measurements.



MAGNI-RAY—a wide-field illuminated magnifier for close inspection on a wide range of work and operations.

ACCURATE GAGING

NOT DEPENDENT ON MEASURING SKILL

The demand for closer tolerances at a time when skilled mechanics and toolmakers are difficult to obtain, makes the use of snap gages a practical necessity for accurate measurement of mass produced parts.

Through the use of ATLANTIC ADJUSTABLE LIMIT SNAP GAGES, accuracy in checking is made possible without dependence on the operator's skill or "feel" on which other measuring instruments depend for precise inspection. Once set, practically any operator can tell by the "GO" and "NO GO" parts of the ATLANTIC SNAP GAGE whether the part under inspection has been produced to the correct, specified limits. Faster inspection as well as more accurate results are assured —production as well as assembly can be stepped up.

ATLANTIC ADJUSTABLE LIMIT SNAP GAGES are manufactured in a modern gage and instrument shop with special machinery and tools and under proper atmospheric conditions for the finest machining, grinding and lapping. Gaging pins and anvils are hardened, ground, carefully lapped and must pass rigid tests for flatness and parallelism. Castings are of MEEHANITE to assure the maximum in rigidity and permanence of form and accuracy.

MADE IN THE FOLLOWING RANGE OF SIZES

Model A—in 10 Frame sizes and in size ranges from 0-1/2" to 5 1/4-6" inclusive.

Model C—in 19 sizes ranging from 0-1/4" to 5 5/16" to 5 11/16".

SCHERR Snap Gage Stand

This stand provides a vise or clamp for holding micrometers, snap gages and other tools. It eliminates errors due to body heat and frees both hands for checking work. Greater accuracy and speed in inspecting as well as less fatigue are important advantages resulting from the use of SCHERR TOOL STAND. Price $7.50. Order Today!

Write, wire or telephone (Canal 6-1464) for quotations and delivery dates

GEORGE SCHERR COMPANY, INC.

126-128 LAFAYETTE ST., NEW YORK, N. Y.

BAKER

EXTRA HEAVY DUTY MULTI-OPERATION DRILLING AND BORING MACHINE

IN this picture you see an adaptation of standard Baker Units to high production multi-roughing operations in the cross bores of airplane propeller hubs. Five operations are progressively performed so that one hub comes off the machine at every indexing.

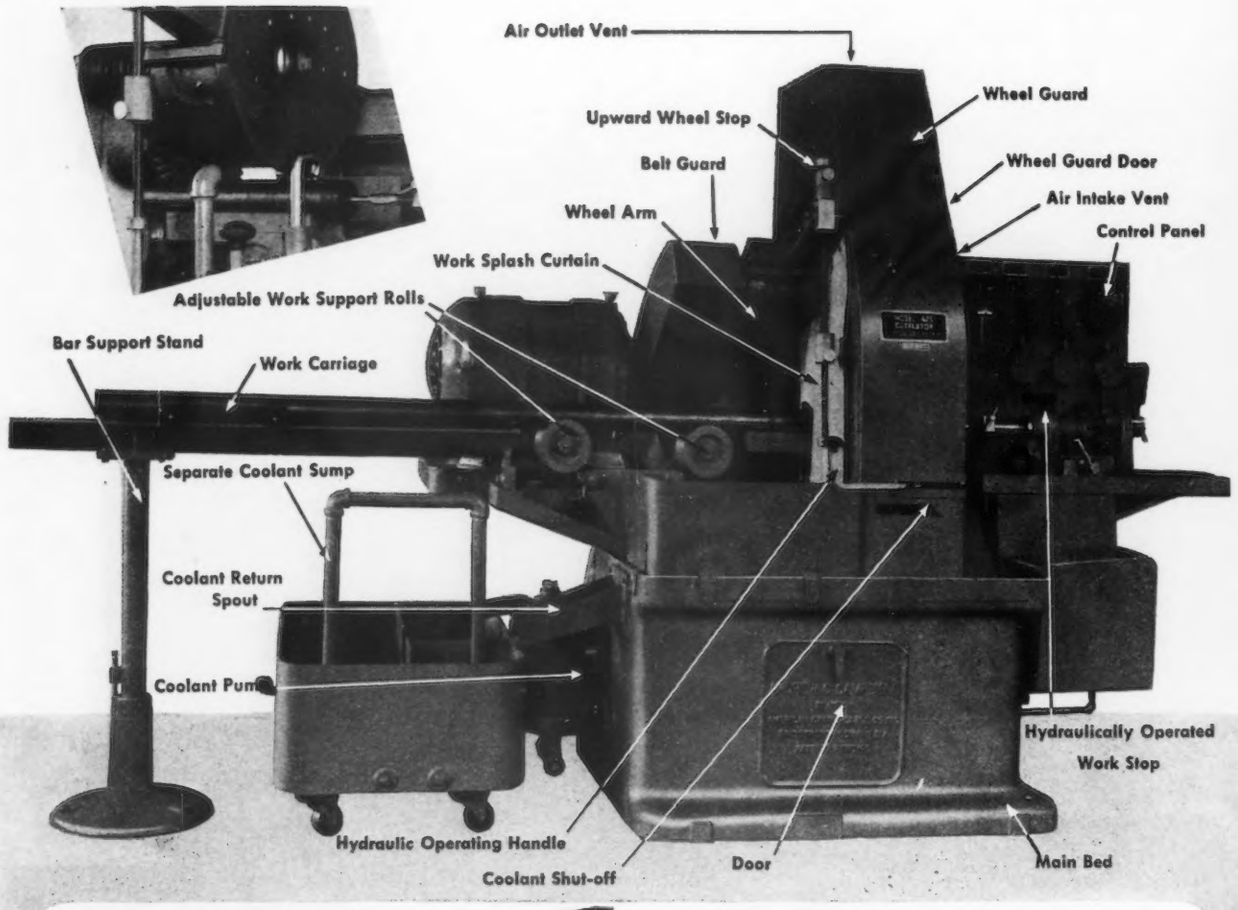
THE machine has six stations, one of which is for chucking. As these hubs are solid forgings of rough material, the machine must have and does have rigidity and power to sustain continuous production. The main drive and oil gear pump drives total 90 h.p.

OUR MOTTO SINCE 1867

"MACHINES: STURDY and EFFICIENT, AS FINE AS CAN BE BUILT"

BAKER BROTHERS INC. Toledo, Ohio, U.S.A.

DRILLING • BORING • TAPPING • AND • KEYSEATING MACHINES



NEW! THE Campbell CUTALATOR

FOR ABRASIVE CUTTING OF TUBULAR SECTIONS TO 4½" DIAMETER . . . AND *ANY* SOLID STOCK TO 3½" DIAMETER—*WITH TOP EFFICIENCY*

You get accurate set-up because of new, hydraulic work stop. *Your production speed is increased by the controlled, rapid approach of the wheel to the work—and by the predetermined rate of cutting.* *Short arc of wheel contact, due to the oscillating-rotating motion of the wheel, gives you economical cuts.* *Accuracy and economy are added to by adjustable coolant wings.* *Finally, the new Campbell Cutalator is engineered to make certain that you get these advantages in your shop—the operations centering on the multiple positioned lever which hydraulically (a) positions stock automatically (b) clamps work and starts coolant flow (c) controls wheel approach and (d) starts predetermined-speed cutting.*

● The New **CAMPBELL CUTALATOR** is another example of how Campbell has engineered cutting machines to fit today's production—another reason for their current use on aircraft, aircraft engines, propellers; and for the production of trucks, cars, tanks, guns, bombs, shells, small arms ammunition, field telephones, etc.

● You will be under no obligation if you have a Campbell engineer study your cutting problems. Yet his suggestions may lead to important economies and increase in production.

A new booklet gives the interesting details of what you can expect of the new **CAMPBELL CUTALATOR**. Write for a copy.

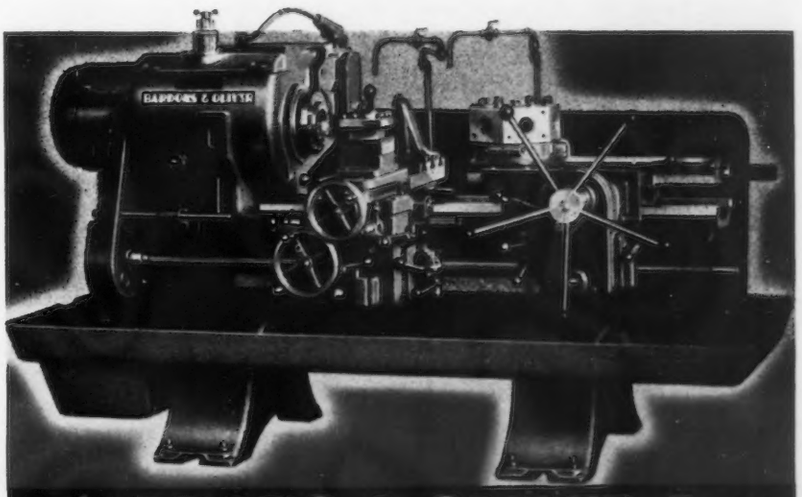
ANDREW C. CAMPBELL DIVISION • Bridgeport, Connecticut

Campbell ABRASIVE CUTTING MACHINES

AMERICAN CHAIN & CABLE COMPANY, INC., BRIDGEPORT, CONNECTICUT

WHEN YOU BUY A TURRET LATHE

POWER TO SPARE – to handle today's carbide jobs.
ADEQUATE RANGE OF SPEEDS – because efficient production depends on the use of correct cutting speeds.
GREAT RIGIDITY – to permit heavy cuts at high speeds.
EASY OPERATION – to conserve your operator's energy.
HIGH DEGREE OF ACCURACY – to produce a high quality product.
LOW MAINTENANCE – to keep your production rolling steady and your cost low.
All of these worthwhile advantages will be yours with a Bardons & Oliver Turret Lathe.

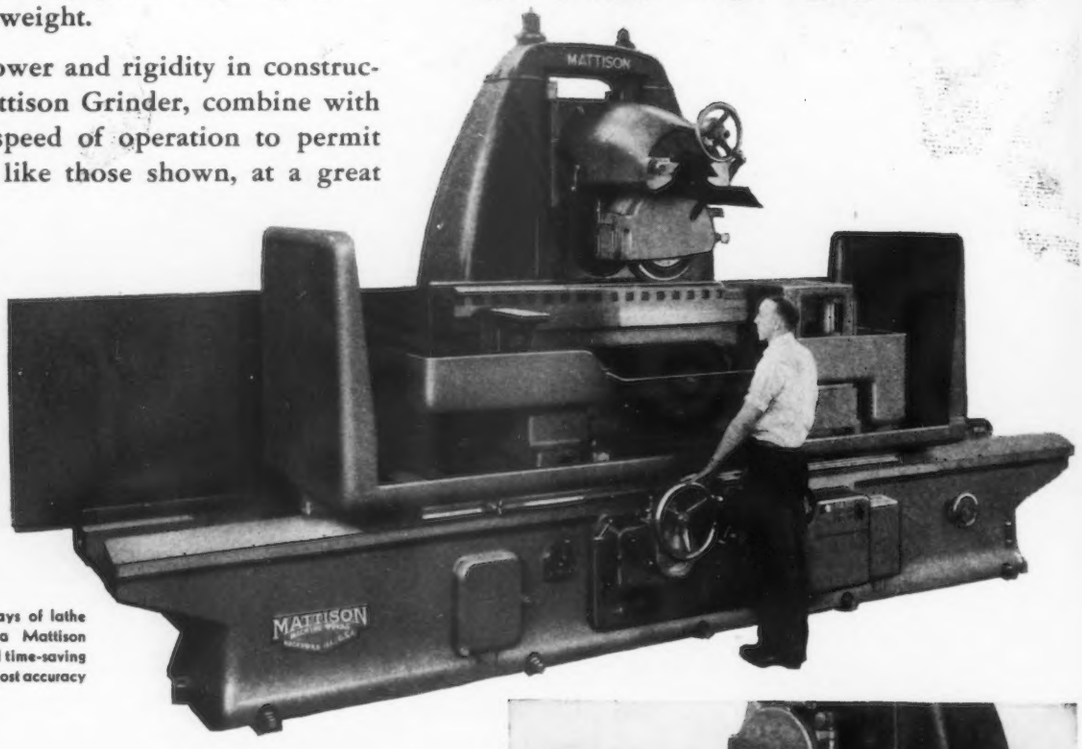


BARDONS & OLIVER, INC.
1133 W. 9TH ST. . . . CLEVELAND, OHIO

Precision Surface Grinding on a BIG SCALE

Mattison Surface Grinders are providing a fast, economical and exceedingly accurate method for finishing parts weighing up to several tons in weight.

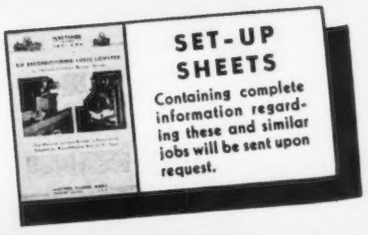
The High-Power and rigidity in construction of the Mattison Grinder, combine with accuracy and speed of operation to permit handling jobs like those shown, at a great saving of time.



● V-shaped and flat ways of lathe bed being ground on a Mattison Grinder. A practical and time-saving method for grinding to utmost accuracy and smooth finish.

● Five ton lathe bed with hardened steel ways. Ways and heads of hold down bolts ground complete in one setting. Time is saved; a more accurate job is obtained.

● Three ton heading slide previously hand scraped — now ground in 62% less time. A fine finish and close accuracy is secured with no scraping necessary.



SET-UP SHEETS

Containing complete information regarding these and similar jobs will be sent upon request.

MATTISON MACHINE WORKS

ROCKFORD · ILLINOIS

POP'S ON THE WAR-PATH AGAINST WAR-WORK WASTE

THERE GOES A BLISTERING FOR SOMEBUDDY! ··· POP'S DISKIVVERED A SWELL NICHOLSON SHEAR TOOTH FILE PUFFECTLY RUINED ON A FOUNDRY CASTING JOB..
THAT'S THE SECOND WAR DANCE THE OL' MAN'S PUT ON TUHDAY. THIS AYAM HE CAUGHT JO GLUB SCUFFIN' THE DAYLIGHTS OUT OF THE TEETH OF A BRAND-NEW NICHOLSON BY RAMMIN' IT INTO A KIT OF TOOLS LIKE HE WAS HEAVIN' SCRAP IRON ···
POP HAS ABOUT AS MUCH RESPECK FER A DRIP WHO'S CARELESS WITH TOOLS AS A SKUNK HAS FOR HUMAN DIGNITY!

LET'S GO! U.S.A. KEEP 'EM FLYING!

INDUSTRIAL man-hours were never so precious — maximum production was never more urgent than now.

Tools are still one of the most troublesome "bottlenecks." There is still too much waste of tool life through *improper use, improper care* and *improper selection.*

No tools are more exposed to these life-shortening abuses than files — especially in the hands of today's many new and partly trained workers.

Shop superintendents and foremen can save valuable time, improve efficiency, reduce rejects and material wastage, through an educational drive on *the right use of files — the right care of files* — and *The right file for the job.*

Nicholson and your mill-supply house can help you on all three counts. Nicholson is more than a manufacturer of files for every purpose (over 3000 kinds, cuts and sizes). Nicholson is an authority to whom you can bring your filing problems freely.

FREE LITERATURE **on fundamentals of filing.**

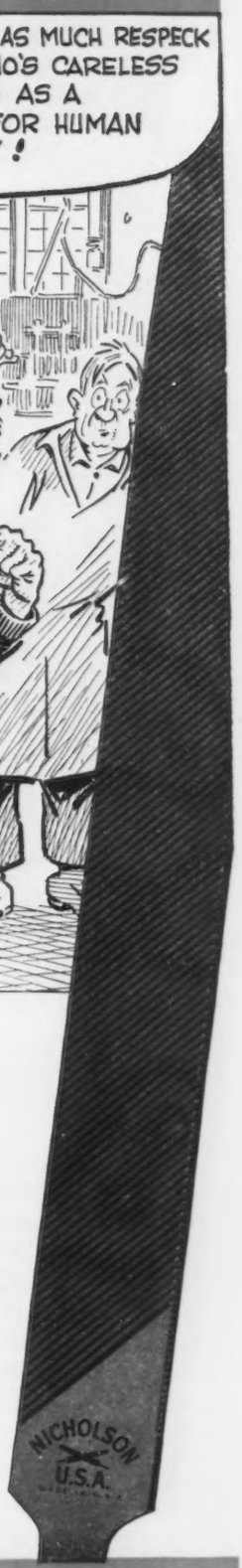
FREE TECHNICAL BULLETINS **on special files for Stainless Steel, Aluminum, Brass, Plastics, Die Castings, Foundry Castings, Die Making; Shear Tooth, Lathe filing. Name ones wanted.**

FREE WALL CHART **on regular file shapes, sizes and cut coarsenesses.**

SHEAR TOOTH FILE *(right)* — one of the Nicholson or Black Diamond "specialists." For rapid soft-metal removal *plus* smooth finishing. The combination of coarse single cut and long angle helps the Shear Tooth to clear itself of chips—minimizes clogging. Coarseness provides fast cutting; long angle gives shearing or "shaving" cut. Flat, Square, Half Round — all sizes — through your mill-supply house.

NICHOLSON FILE CO., PROVIDENCE, R. I., U. S. A.

(Also Canadian Plant, Port Hope, Ont.)



TWELVE PERFECT FILES IN EVERY DOZEN

NICHOLSON FILES

FOR EVERY PURPOSE

NICHOLSON U.S.A. MADE IN U. S. A.

Vulcan Engineering Department. Top, Smithville Road Division. Bottom, Beckel Street Division

• This brochure covers Vulcan's credentials, its organization, its facilities and its experience as designers and as builders. Yes, the booklet also discusses the kind of post-war economy we shall all face, and helps to visualize the service an organization such as ours will be able to render when you confront your final change-over.

LET VULCAN BREAK YOUR DESIGNING BOTTLENECK!

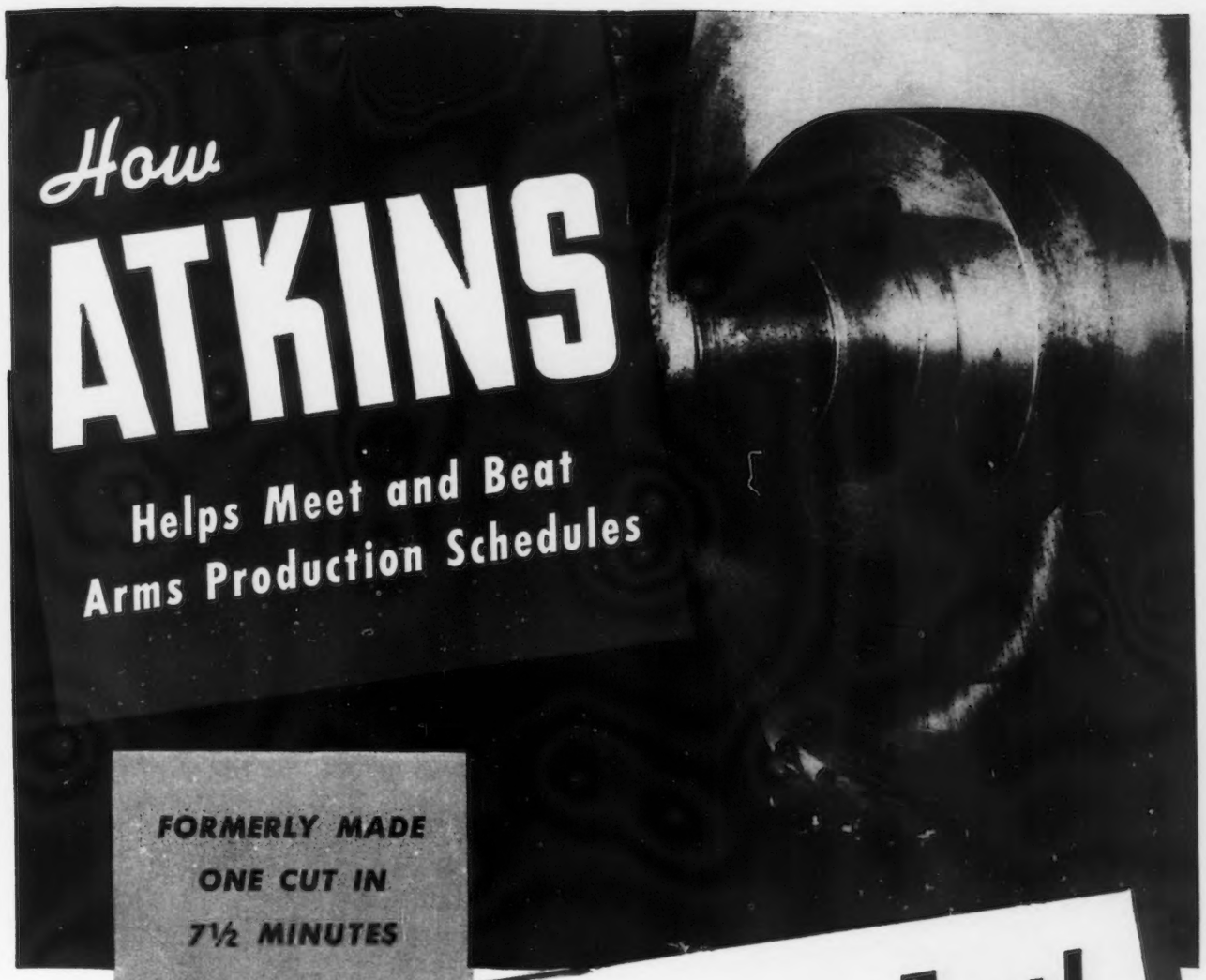
If you are converting to a new product . . .
Or need a faster production line . . .
Or want to redesign your product . . .
Or special machinery must be designed . . .
Or new tools, dies, jigs or gauges designed . . .
Or you seek engineering consultants . . .
. . . Vulcan's engineering and designing staff can take the word picture of your requirements and quickly change it into working blue prints.

We may not be able to build all the equipment we design for you, but our engineering staff *is* ample and expandable, and can help you break the designing bottleneck.

The VULCAN TOOL COMPANY

213 NORTH BECKEL STREET · DAYTON · OHIO

PLEASE SIGN YOUR NAME IN THE MARGIN BELOW, MAIL, AND WE'LL SEND BROCHURE



How ATKINS Helps Meet and Beat Arms Production Schedules

FORMERLY MADE ONE CUT IN 7½ MINUTES

NOW CUTTING 45 Times as Fast!

TIME NOW SLASHED to 10 Seconds

That remarkable increase in cutting speed occurred on a job requiring the cutting of slots in electric cast steel arm brackets for army tanks. The saw was a 6" diameter Atkins Curled-Chip High Speed Milling Saw, equipped with the special 3-dowel Atkins drive. Upon the recommendation of the Atkins engineer, the saw was run clockwise, to cut up instead of down on the material (in contrast to previous practice on the job). This, plus the tremendous cutting speeds made possible by the recently-developed Curled-Chip tooth with its huge-sized inward-curving gullet, permitted cutting rates to be increased 45 times the former rate!

● The staggering performance of Atkins Curled-Chip Saws reported here shows the great possibilities for stepping up production by getting the right saw on the right job—and using that saw in the right way. With maximum production so vital to the whole arms program, plant men will be wise to question present performance on every job involving metal sawing. In shop after shop, the amazing records hung up by Atkins Curled-Chip Saws prove conclusively that former cutting standards can no longer be accepted as a measure of saw output.

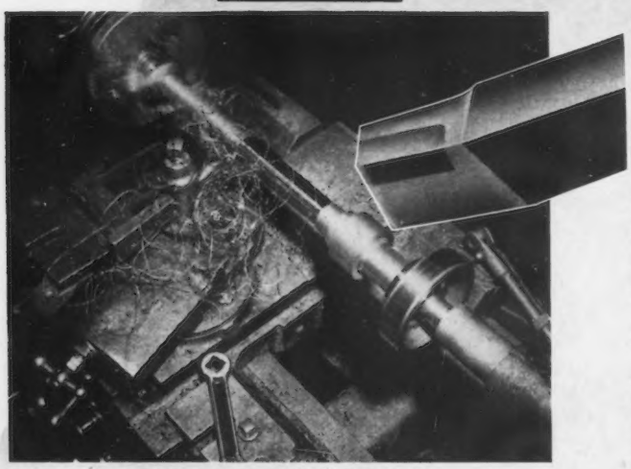
To help you find out whether you are securing maximum production, call on Atkins for unbiased engineering aid. Without obligation, an Atkins engineer will investigate your cutting problems and tell you what can be done in the way of saving time and labor and reducing machine downtime on sawing operations.

E. C. ATKINS AND COMPANY, Indianapolis, Indiana

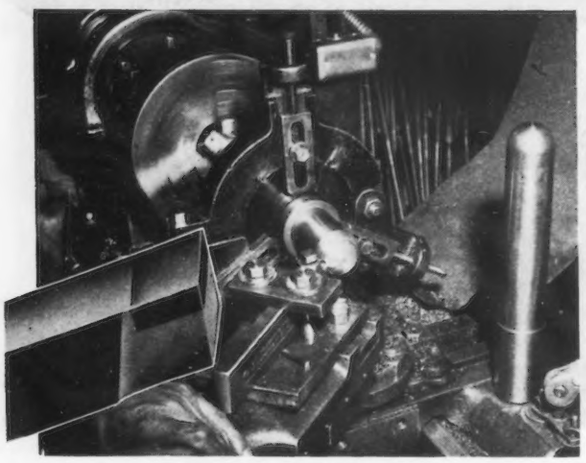
Originators of the Curled Chip SYSTEM OF METAL CUTTING

5-METHOD
COMPLETE TOOL SERVICE for MAXIMUM PRODUCTION

Small Shop Converts to War Work Using Method One



Turning gun parts at high speed using style 11 carbide tipped tool.



Turning nose of shell forging plug using modified style 15 tool.

The conversion of this small shop to the production of shell and gun parts is a typical example of the application of Method One of the Vascoloy - Ramet Complete Tool Service. In using Method One this shop uses some standard tools as they are furnished and also modifies others.

With all the standard tools available in Method One, and the almost countless number of modifications possible, this method offers the easiest way to tool up for the majority of boring, turning and facing operations on aluminum, cast iron, and steels. The standard tool most closely meeting requirements is withdrawn from stock and used as it is or modified by grinding to the desired shape. Simplified tooling practice recommends this Method One wherever possible.

For fast tooling, keep in stock a supply of Vascoloy-Ramet standard tools. Catalogue VR-421 will help you to select the standard tools you should have. Write for your copy.

Ramet

VASCOLOY-RAMET CORPORATION

NORTH CHICAGO, ILLINOIS

DISTRICT SALES AND SERVICE IN PRINCIPAL CITIES

IN CANADA: Carbide Tool & Die Company, Ltd., Hamilton, Ont.

4260

TANTALUM-TUNGSTEN CARBIDE

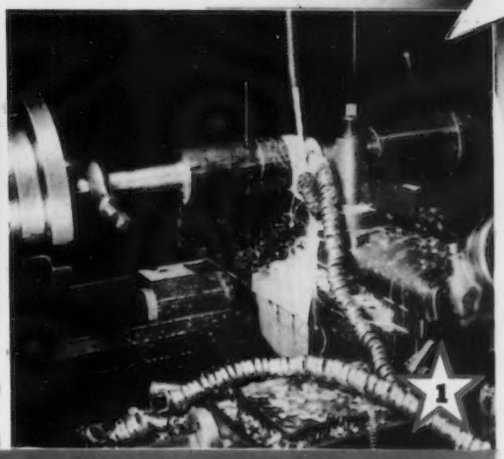
FOR TOOL SERVICE..... *Specify* Vascoloy RAMET TOOLS

TANTUNG "G"

How P&W builds Accuracy into Small Tools at Every Stage of Production

(Condensed from current issue of P&W "Backgrounds")

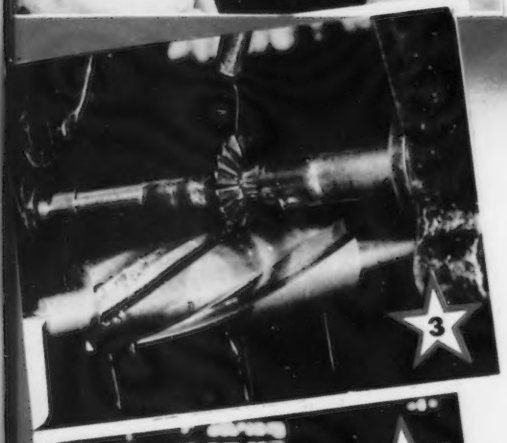
A STAR IS BORN



Let's follow a P&W Taper Reamer through the high-spots of its progress from raw bar stock to an efficient, accurate production tool.

Analyzed by our own metallurgists to make sure it meets our specifications, a steel bar is sawed off, centered, and 1 put into one of our own latest-type P&W lathes, where shank, pilot and cutting surfaces are roughed out. Notice the lathe's cam-lock spindle nose—envy of every operator using an older machine.

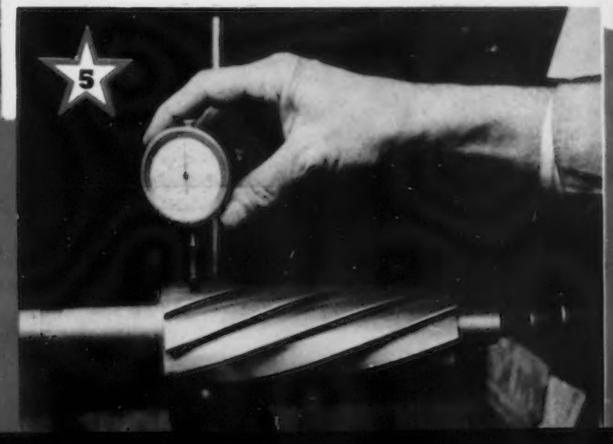
2 Shaped blank then gets a "soft inspection." Inspector here checks the O.D.



3 Back to the machines. Here a miller makes the primary fluting cuts. When a thorough check right here on the job satisfies the operator that everything's OK so far, another cutter replaces this one, and the work gets its secondary fluting cuts, which provide necessary chip room, but still leave proper support behind the cutting edge.

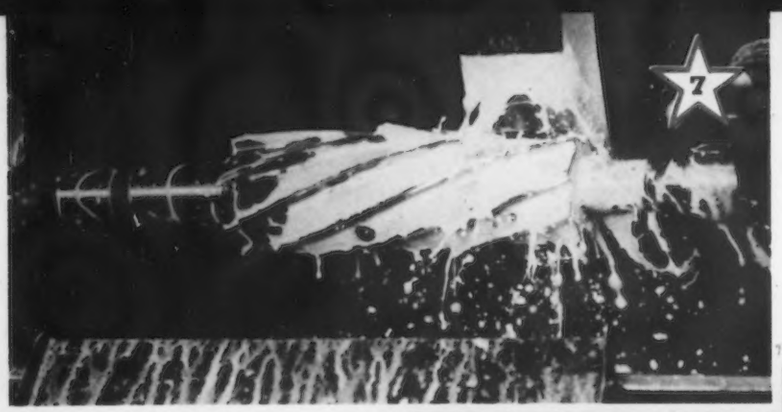
4 "Soft inspection" again. Here the inspector checks the relief angle with the reamer in a special gaging fixture designed by P&W for our own use. Only with such a device as this can these helical jobs be checked with the kind of accuracy it takes to satisfy P&W.

5 Checking for run-out. Reamer is then stamped with the tool number and taper figures in the shallow marking recess in the shank. Hardening begins here. Preheated to the first faint flush of red, it goes through a high-heat salt bath.



6 Incandescent, it's quenched in another hot salt bath, then air-cooled to room temperature, cleaned in boiling water to remove any remaining salt, and straightened if need be.

OVER ★★



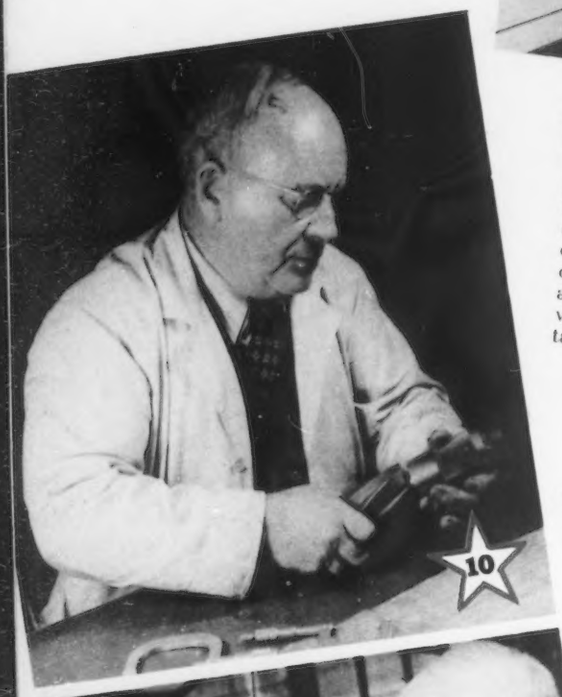
After tempering, reamer is checked for hardness on Rockwell machines. If size or shape makes machine-testing impractical, P&W file-tests against standard pieces of known hardness. Using special files as gages, experienced P&W men can check within one point of what the machines would show. **7** Now the long grind begins. Cutting edges of this reamer are to be in two planes — parallel to its axis and converging with it. Straight portion of O. D. has been ground and checked to "tenths"; tapered portion of the O. D. now feels the broad wheel.

A STAR IS BORN

(continued from preceding page)

8 Another check, P&W Small Tools Inspection Chief Louis Barrett doing the work. Normally the grinder operator would do this to determine the exact setting of his machine to produce the required taper. Hoke-block-and-sine-bar set-up provides the most accurate taper check *anywhere*.

9 After pilot and flute grinding comes relief-grinding, another operation where P&W "know-how" is invaluable to our customers. The O. D. of all cutting edges has been carefully established and the cutting face carefully trued. Now this operation accurately grinds the proper primary and secondary relief angles, following the taper and leaving just a hairbreadth of full O. D. land for cutting. When the reamer goes into service, these relief angles will let it cut *right*. When eventually it is dulled, they will permit sharpening without disturbing the accurate taper, and retaining full cutting qualities. But *you don't have to know all this* . . . you just place your order, tell us what the problem is, and leave the headaches to Pratt & Whitney.



10 Everything about this reamer has been checked several times, but now that it's finished, P&W old-timer John Ramsay gives it final checks.

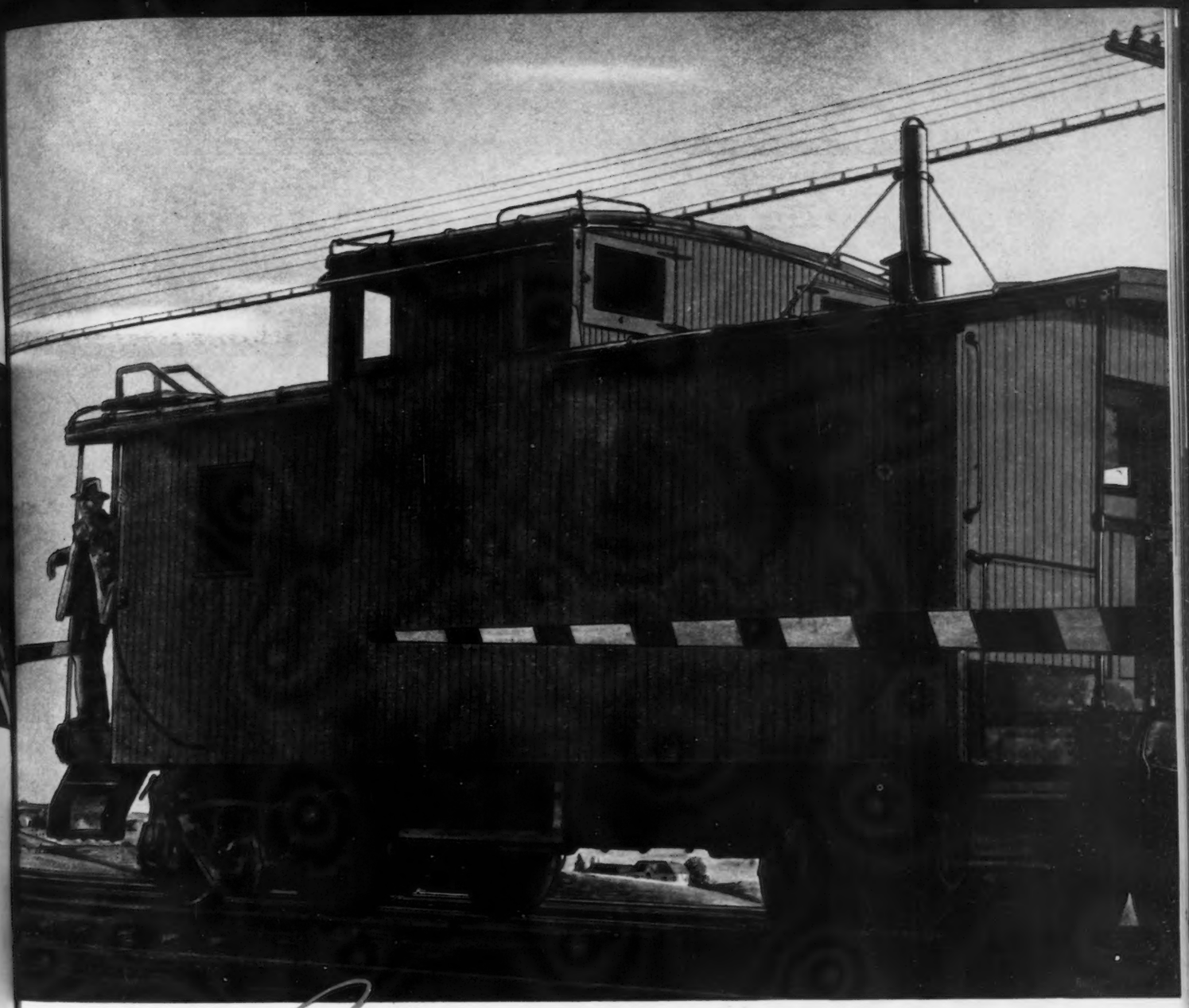
11 Mounted on centers, our reamer is checked again for run-out. Ramsay again, Barrett kibitzing.

12 This is it, ready to join other P&W small tools working to build a coffin for Hitler. Exceptional only because its birth has been so thoroughly documented, this reamer is just one of thousands of P&W top quality small tools running our production gamut at the same time. As you read this, it's at work for Victory.

PRATT & WHITNEY

Division Niles-Bement-Pond Company

WEST HARTFORD • CONNECTICUT



Caboose – SYMBOL OF AN END

TODAY, long freight trains cross and recross the country in ever-increasing procession — proof of America's all out war effort. How familiar, the experience of waiting behind gates at a rail crossing for a train to pass, impatiently anticipating the sight of that little red house on wheels — the caboose — symbolizing the end of the train and our release.

Private industry, too, must await that release, for the gates, of necessity, were put down to halt individual enterprise for the duration. The problem of arming the allies has welded the united efforts of many peoples into a single purpose for national offense.

We, the Precise Tool and Manufacturing Co., are some of those people and we are happily aware of the job we are fitted to do in the war program. Trained to the exacting precision of the automotive industry, our skilled workmen and modern plant facilities have effortlessly fitted into the schedule of concentrated war time production.

But the gates won't be down permanently and we are looking forward to the day when this biggest job of all is successfully completed and we can again supply private industry with the precision instruments of tomorrow that today belong to Uncle Sam.

PRECISE

PRECISE TOOL & MANUFACTURING CO.

FARMINGTON, MICHIGAN

Faster and More Accurate Production

TAYLOR-WILSON
Cutting-Off Machine

In war plants throughout the country Taylor-Wilson Cutting-Off Machines are performing with speed and accuracy, making it possible to step up schedules of vital production for our fighting forces.

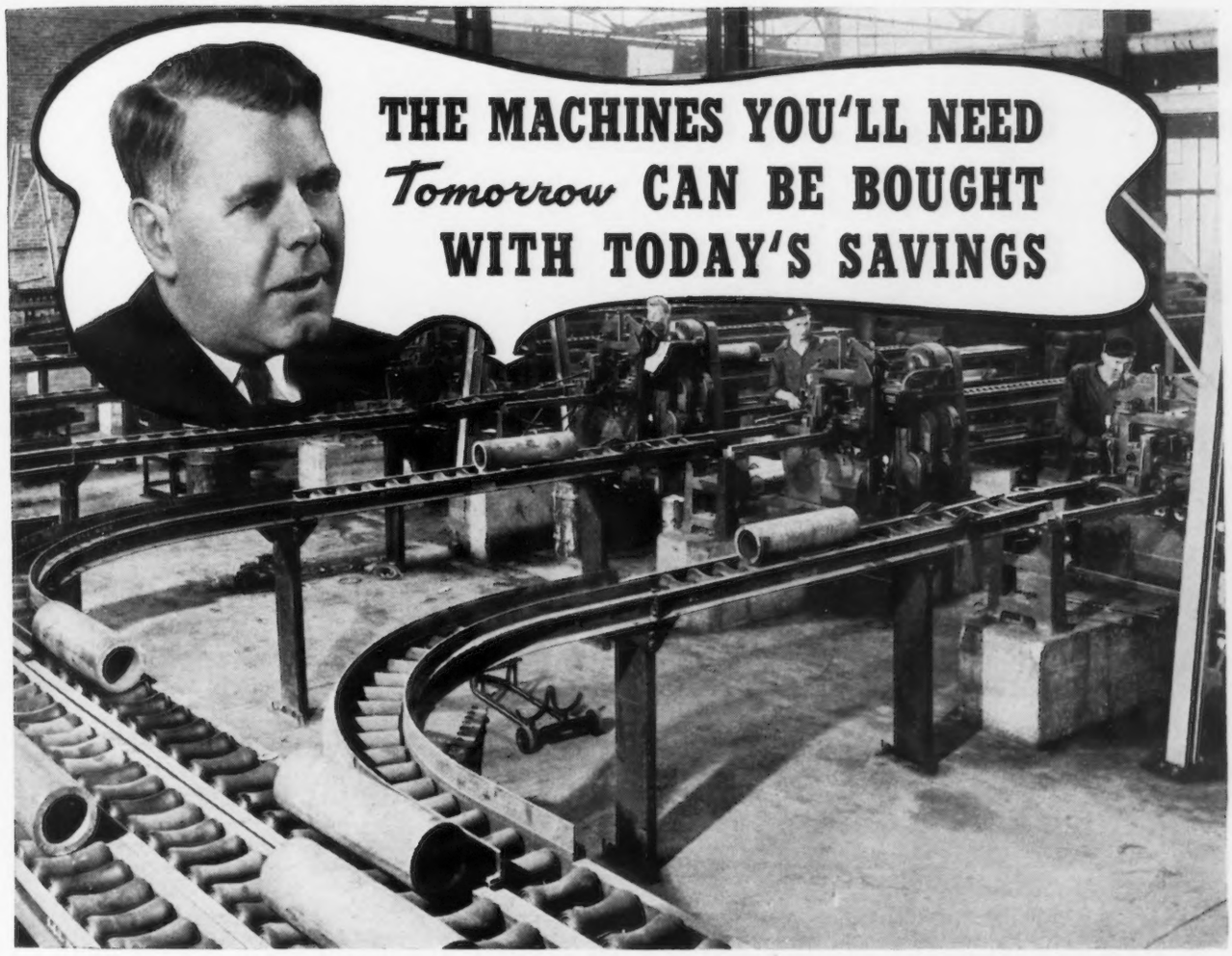
Taylor-Wilson Machines are sturdy, vibrationless, long lasting, and accurate at all speeds within the limitations of the cutting tools. Many of them in many plants are saving valuable time in cutting off pipe or tubing for Coupling Stock, Roller Bearing Blanks, Bomb Blanks and other vital production. Sizes 1″ to 24″ Diameters.

Write for Descriptive Literature

TAYLOR-WILSON MFG CO.

25 Thomson Ave., McKees Rocks, Pa.

PITTSBURGH DISTRICT



Performance

Cutting SAE 105 shell stock, after piercing. The compensating, hydraulic feed safeguards the blade while cutting this 485 Brinell, hard, forged tube.

PEERLESS SAWS SAVE TIME, METAL, BLADES

Today's Wartime savings and profits, invested in War Savings Bonds, will speed the Victory. And, the dollars you lend to your government will establish a fund for the new machines you'll need to "tool up" for peacetime operations.

Peerless Saws help you buy more bonds by saving time, metal and blades on your sawing operations.

The Peerless Four-Sided Saw-Frame and Backing-Plate Blade-Support speed up metal cutting and the thin, cool-running, straight cutting Peerless Blade removes as little as 1/16" of the stock. Blade life is lengthened . . . cutting time is improved . . . and metal is conserved.

Consider the Peerless 3-way saving for your metal cutting jobs. Send in your test samples. We'll cut them and show you how.

PEERLESS MACHINE COMPANY • RACINE, WISCONSIN

Peerless
METAL SAWING MACHINES

PEERLESS MACHINE COMPANY, Dept. IA-1042 Racine, Wisconsin

Mail cutting time estimate for.....

.....

☐ Mail catalog on Hydraulic type Saw for High Production Cutting
☐ Mail catalog covering Vertical type used for Die Block Work
☐ Mail catalog on Mechanical type Saw for production cutting
☐ Mail catalog on general utility and maintenance Saws

Company.....

Individual.....

Street.....

City.....State.....

FAST, ACCURATE CUTTING DEMANDS POSITIVE BLADE CONTROL

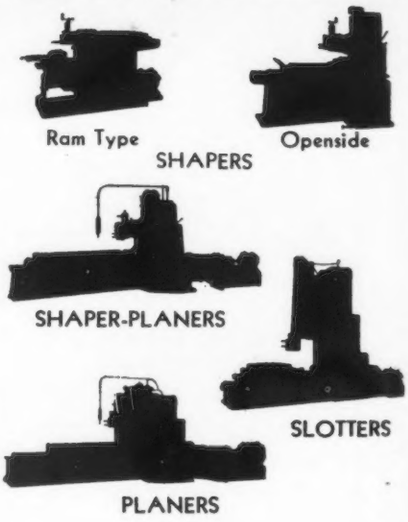
ACTION... With Bugle Calls!

Building *Hy-Draulic* Machine Tools As Fast As It Can Be Done Right

★ In long overlapping schedules, everybody here shares in building Hy-Draulic Machine Tools as fast as it can be done right. Production marches forward steadily, seven days every week. There's action here — *plenty* of action. It's grim, tough, disciplined, determined.

Listen! — What's that assembler whistling? Move closer. Listen. There! Get it? Bugle calls! Learned in 1918. He has since helped build many Hy-Draulic Machine Tools for our army and navy. He knows that all Hy-Draulic Machine Tools now building will go into war work. He knows that these products of special skill and experience save time, conserve operator's energy; promote increased production, higher accuracy, finer finish. He'd like to lick the Axis personally, but he knows that he helps far more effectively right here, than he could on any other battle front. Everybody here works on that basis. We want everyone to know about the many advantages of Hy-Draulic Machine Tools — and to know that we are building them as fast as it can be done right . . . . — for Victory.

RECIPROCATING
Hy-Draulic
MACHINE TOOLS



Details and Action

Hy-Draulic Machine Tools listed above are illustrated and described in separate bulletins. Write for your copies, today. Anticipate requirements of war work and future commercial manufacturing. Order Hy-Draulic Machine Tools *now* for prompt delivery according to official priority ratings.

Hy-Draulic
Reg. U. S. Pat. Off.

Shapers..Planers..Slotters..Shaper-Planers

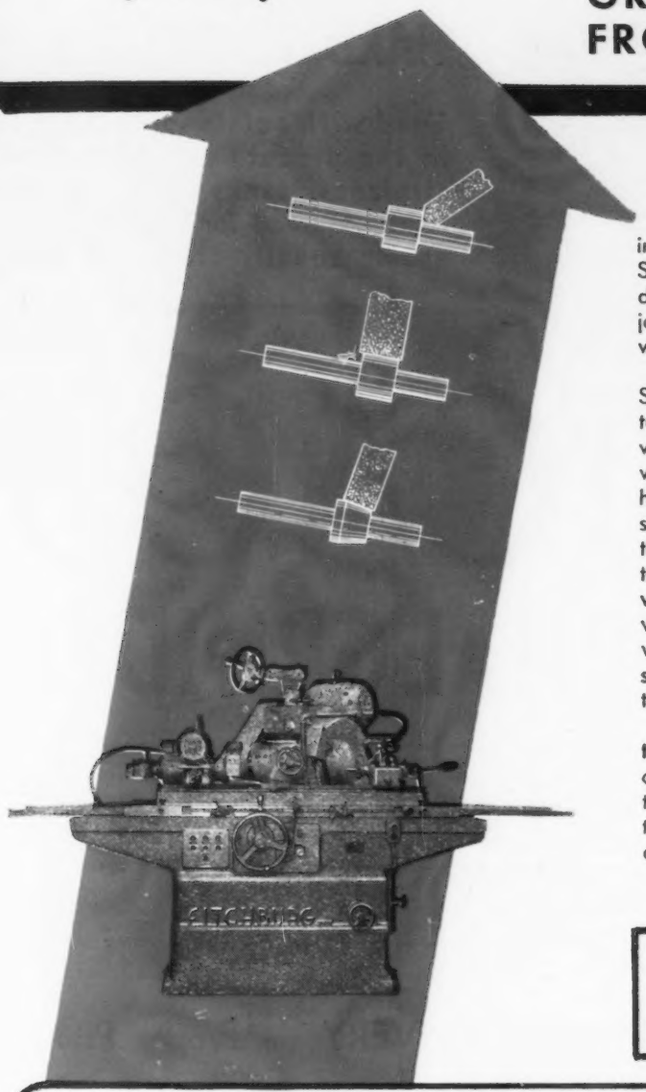
ROCKFORD MACHINE TOOL CO.

ROCKFORD, ILLINOIS, U.S.A.

New FITCHBURG ADJUSTABLE "TYPE C"

Angular Head Grinder

FOR PLAIN CYLINDRICAL GRINDING . . . . . FROM *0 degrees to 45 degrees*



The Fitchburg Adjustable "Type C" Angular Head Grinding Machine is another single application of the Fitchburg Standard Bowgage Wheelhead Unit. The "Type C" is designed to handle a wide range, and a number of types of jobs. In finding ways to cut your grinding time and costs it will pay to consider what this machine can do.

This newest of Fitchburg plain cylindrical grinders has a Standard Wheelhead Unit mounted so that it may be located to grind from 0 degrees up to a 45-degree angle. Previously angular head grinding machines have been equipped with fixed heads for single purpose grinding. The Bowgage head on the Fitchburg "Type C" is adjustable and can be swivelled to various positions for standard plain grinding, thus providing greater grinding utility. The head goes through a completely automatic cycle — rapid traverse to work, correct feed, grinding dwell and rapid return. The workhead is adjustable for various lengths of work and the work spindle can be equipped for single or variable work speeds. The trueing device is hand operated and mounted on the work table.

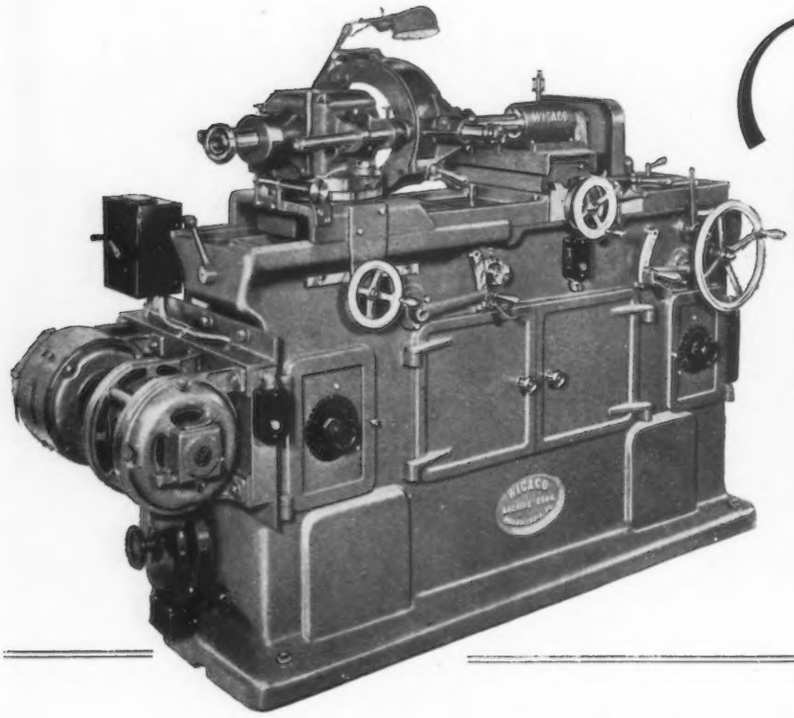
The Fitchburg "Type C" grinder is designed to meet war time production speed and maintain highest efficiency. Ease of operation is assured by centralized controls. In every detail it meets all the requirements of plain cylindrical and taper grinding — in large or small lots of work, with assured accuracy and fine finish, at low cost.

Send for new fully illustrated folder — write for it on your business letter-head — it will be mailed free.

FITCHBURG GRINDING MACHINE CORP.

FITCHBURG, MASSACHUSETTS, U. S. A.

Manufacturers of **— Bowgage Wheelhead Units, Multiple Precision Grinding Units, Spline Grinders, Cylindrical Grinders, Gear Grinders, Bath Full Universal Grinders and Special Purpose Grinders.**



Precision

ON THOSE CRITICAL, HARD-TO-DO JOBS!

Used with outstanding success in the production of parts for airplanes, tanks, guns, bomb-sights . . . and for other work requiring equally close tolerances.

NOTE THESE IMPORTANT FEATURES

WICACO INTERNAL GRINDER

Underslung Drive—Standard motors, hung on the doors, are accessible for inspection. They drive the workhead and carriage from a position directly beneath them. Wheel-drive motor is hung under center of carriage, so ways absorb most of torque, promoting extreme accuracy by reducing vibration. Drives have constant tension device; are self-adjusting. Motors start under full load and are protected against overload damage. They are also protected from moisture and grit.

Rigid Work-Head—Rigidly-built work-head and carriage. Two oversize bearings, with positive adjustment support spindle, which is ground to receive any standard tapers and threaded for standard chucks. Spindle control made through lever at left, while rheostat on variable speed motor provides wide selection of speeds.

Automatic Reverse—Carriage is driven by variable speed A.C. or D.C. motor with dial control, providing for 16 speed variations *and will traverse .001" movement.* Automatic reversing device will automatically reverse carriage without damage to machine or alteration of adjustments should any obstruction come between fixed parts of machine and moving carriage or wheel. Advantage of this feature can readily be seen in grinding blind holes or shoulder work. Fillets can be used in place of weakening clearance cuts, and shoulders can be gauged by carriage stops which are graduated to .001".

Easily Operated — Economically Maintained—All concealed units are mounted on hinged doors for ready inspection. Revolving parts are corrected for dynamic balance. The Diamond Wheel-Truer is easy to adjust. Shipped ready to hook up to current and operate, and built to give long accurate service at exceptionally low operating and maintenance cost.

Write for Complete Information

Available for PROMPT DELIVERY on Proper Priority

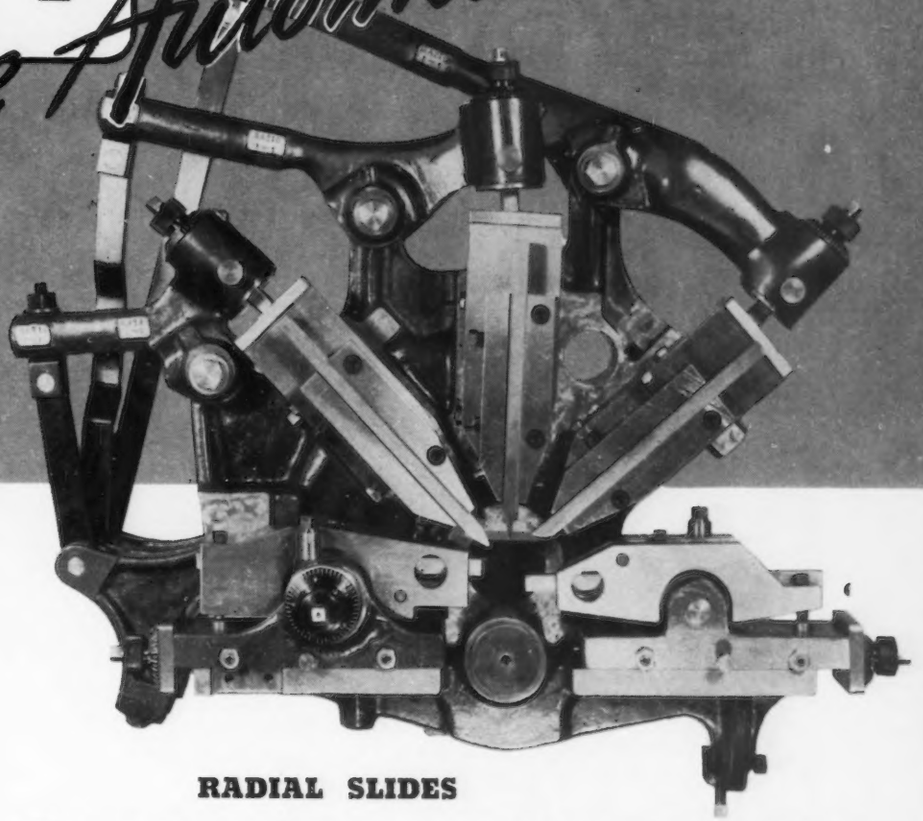
75th YEAR

THE WICACO MACHINE CORP.

WAYNE JUNCTION, PHILA., PA.

CECO Automatics

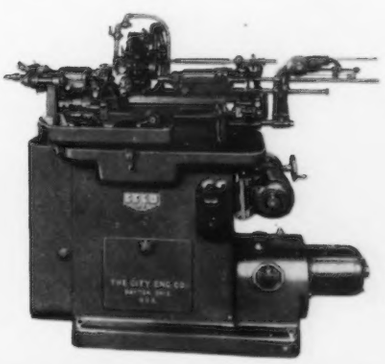
Swiss Type



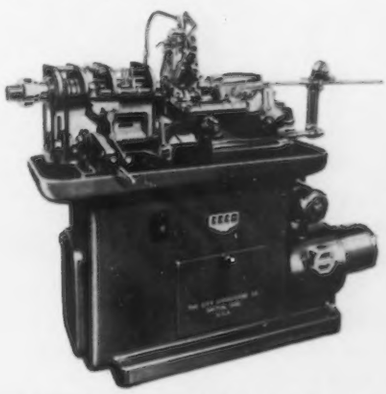
Here are a few pieces we have made from bar stock in **ONE** *operation*

RADIAL SLIDES

This universal, Swiss Type, precision machine uses very simple and very inexpensive standard tool bits in place of the conventional indexing turrets, box tools and form tools. These tool bits turn and face the work as the revolving bar stock is being fed forward through the work guide bushing just back of the bits. This guide bushing does the work of the steady rest on a tool room engine lathe, assuring concentricity. ★ The bits are advanced radially to the work and are receded when not in use by means of flat cams mounted on a single camshaft located at the back of the machine. ★ Accuracy of diameters and lengths of shoulders are maintained by means of double micrometer adjustments. Odd shapes, such as radii, complicated forms, and tapers, can be produced by generating the flat cams mounted on the camshaft. Drilling, reaming, counterboring, tapping, threading, etc., are accomplished by attachments mounted on end of machine.



4 SLIDE — Above machine has four radial tool slides with bar capacity of ⅜" diameter and a turning length of 1½" with flat cam and 2¾" with bell cam, and infinitely variable spindle speeds ranging from 675 to 6100.



5 SLIDE — Above machine has five radial tool slides with bar capacity of either ⅜" or ½" with a turning length of 4" with flat cam, and infinitely variable spindle speeds ranging from 755-7500.

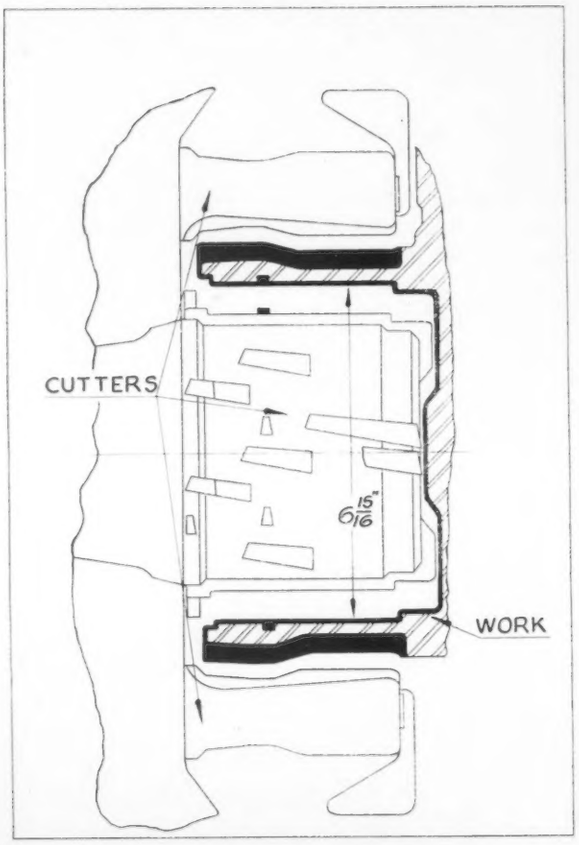
THE CITY ENGINEERING CO.

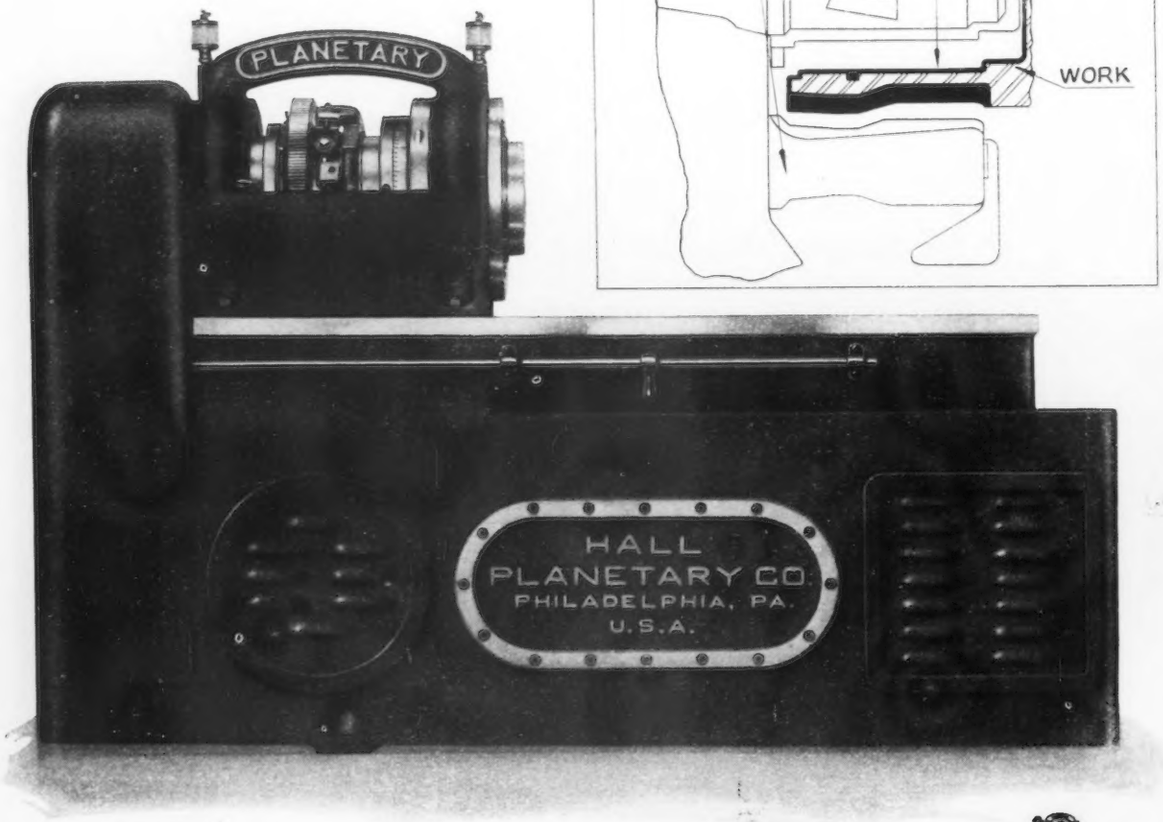
Dayton, Ohio

Production

Propeller Hub Arms — 15 minutes each, rough or finish operations. Internal and external simultaneously. Accuracy well within requirements.

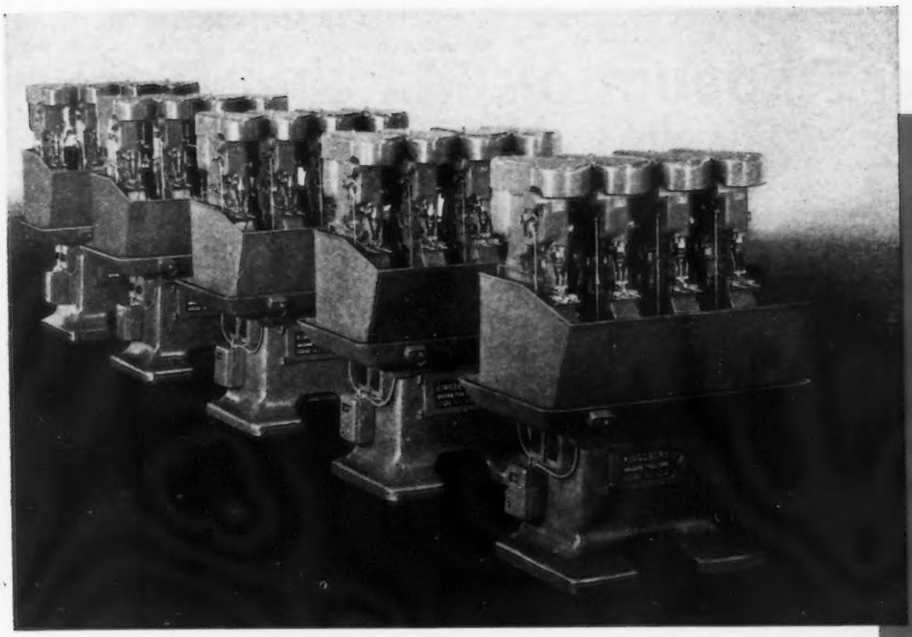
Send us your prints.

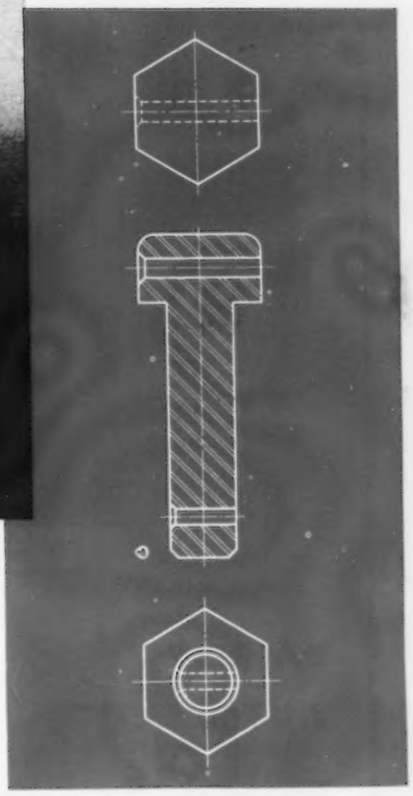




HALL PLANETARY CO.

FOX STREET & ABBOTSFORD AVENUE, PHILADELPHIA, PA.

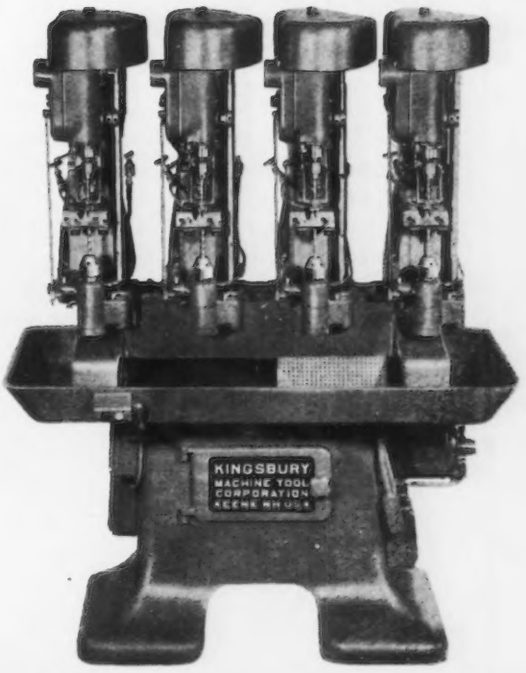




A Standard Machine by KINGSBURY for High Production on "Cross-hole" Jobs

KINGSBURY, specialists in automatic equipment for speeding up all types of production operations, have applied their skill to the production of a standard drilling machine with the efficiency of the well-known FLEXIMATICS. On jobs where drilling time is short and the operator needs both hands to handle the work, KINGSBURY Drilling and Burring Machines provide completely automatic operation, from the time the work is placed in the fixture until it is automatically ejected. The machines illustrated consist of standard No. 8 Drilling Units, standard cross-hole drilling fixtures and standard underneath burring units. The latter operate while the top drills are retracting. They are available in one to four spindle units, with or without the burring units and fixtures.

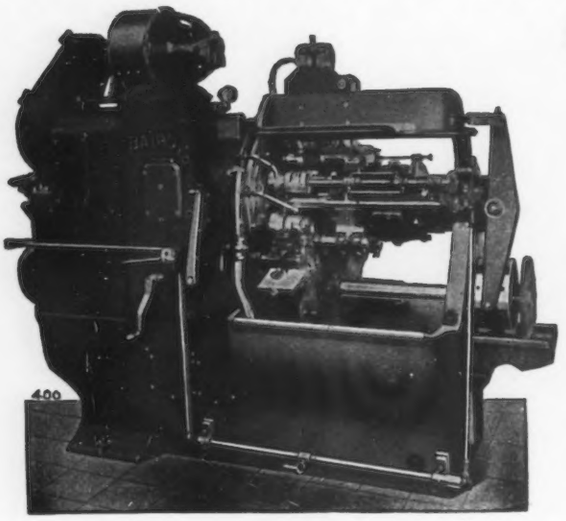
Bank on KINGSBURY'S reputation for efficient automatic equipment! Choose these Drilling Machines for those cross-hole jobs that slow up production in your plant.



KINGSBURY MACHINE TOOL CORPORATION

KEENE NEW HAMPSHIRE U.S.A.

BAIRD HIGH PRODUCTION MACHINE TOOLS



A BAIRD 7" Six Spindle Horizontal Indexing Chucking Machine

Multiple Spindle Automatic Lathes
Indexing and Continuous
Horizontal and Vertical
Special Automatic Machines

designed and built to obtain highest production.

Machines for turning, facing, drilling, threading, milling, and so forth.

If you require machines for high production, send sample and print of the part to BAIRD for a report.

No obligation to

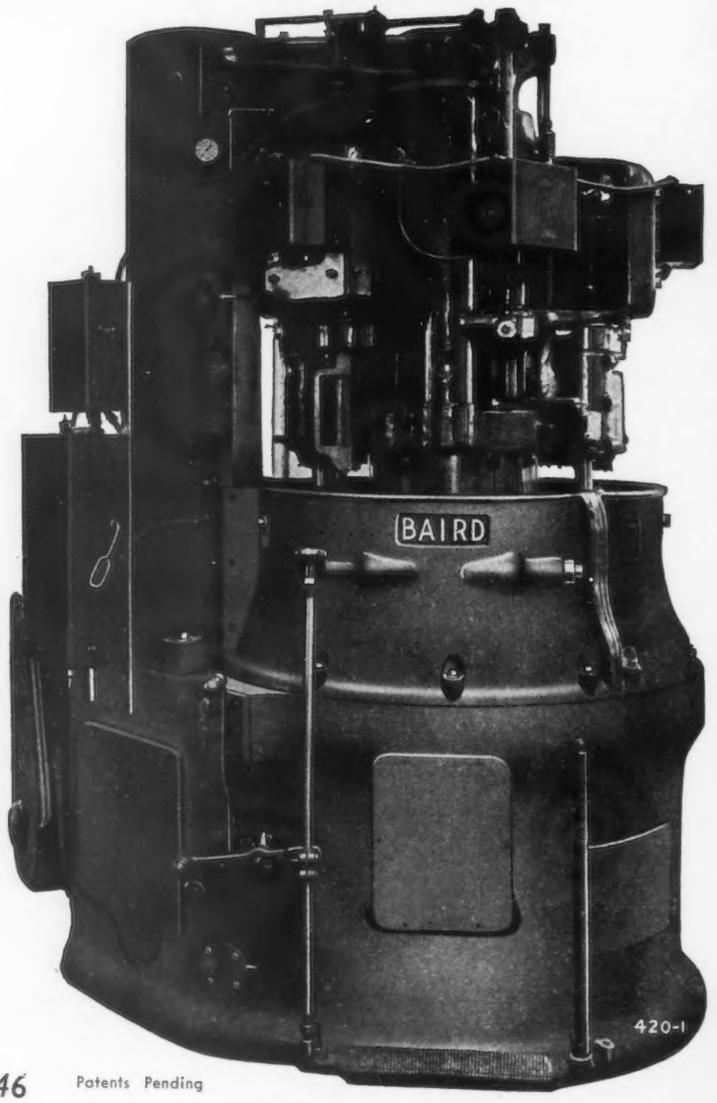
"ASK BAIRD ABOUT IT"

BAIRD AUTOMATIC GRINDERS GRINDING AND TURNING MACHINES

BAIRD specialty is the designing and constructing of high grade high production machinery.

Save your time by sending to BAIRD sample and prints of the part you wish to produce in quantity and let BAIRD report the findings of its engineers.

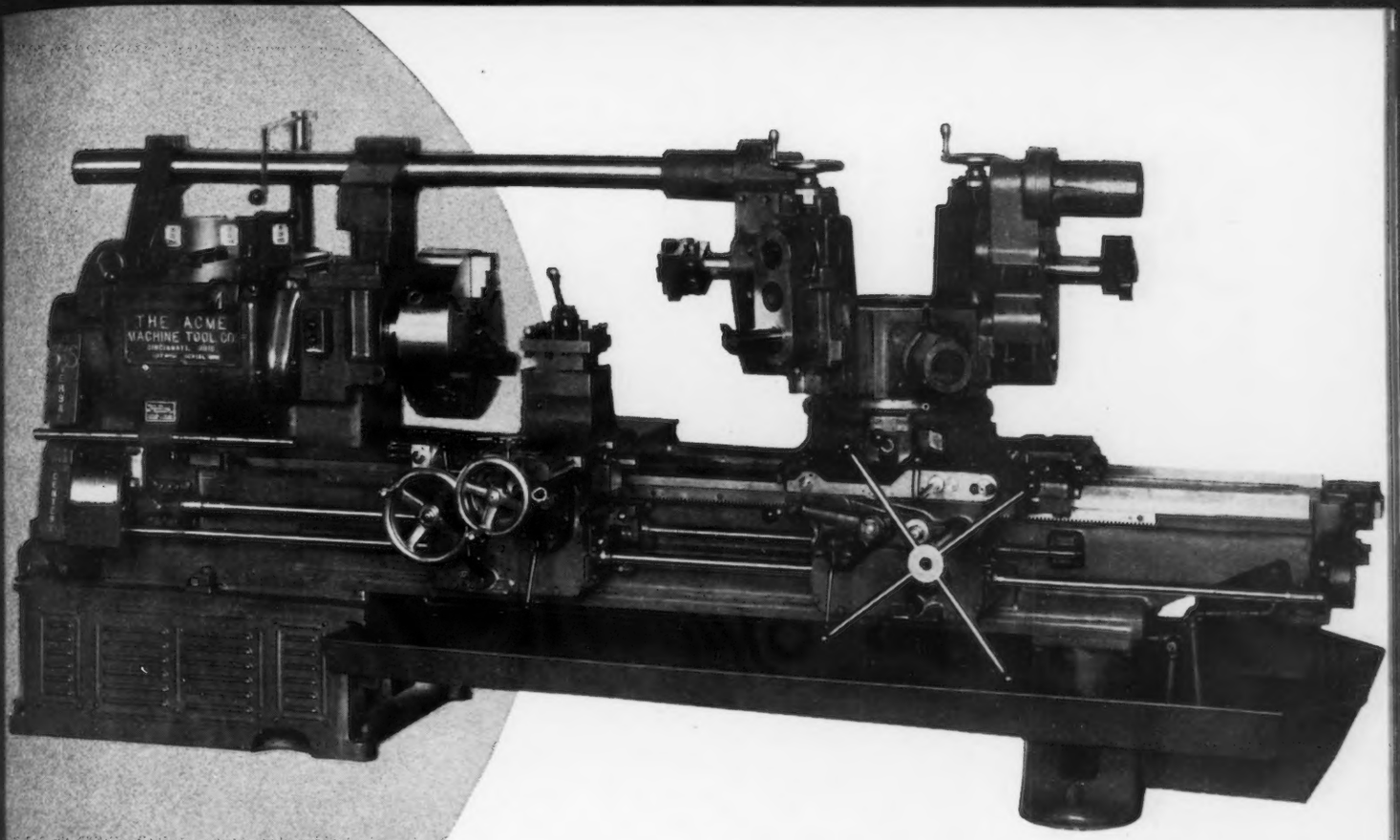
No obligation.



THE BAIRD MACHINE CO.
BRIDGEPORT, CONN., U. S. A.

Joe Baird started business in 1846

Patents Pending



CINCINNATI ACME

RESPONDS TO INCREASED DEFENSE EFFORT WITH THE *NEW 3S-ACME* UNIVERSAL TURRET LATHE!

• The 3S-ACME is a machine of improved design and large capacity with abundant power and rigidity plus ample speeds and feeds to meet demands of carbide and other high production tools so necessary to speeding up defense operations.

This ACME features a stationary overhead pilot bar which not only makes for increased accuracy but for speeding up operation on jobs requiring rigid support to cutting tools. Another advantage is the safety factor, as there is no overhanging bar projecting from the turret to cause trouble for operator.

It is built in 24" and 28" Swing for chucking work and up to 4¼" diameter Bar Capacity.

...The ACME MACHINE TOOL CO.,
...CINCINNATI, OHIO.

ARMSTRONG

THE ARMSTRONG PRINCIPLE AGAIN MEETS A NATIONAL EMERGENCY ★ ★ ★

Overnight the National Defense Program created a new industry of such tremendous proportions it is measured in multiples of the vast automobile industry, and with it, created great shortages of machines, factory space, skilled labor, raw materials . . . of almost everything used in industry.

First and greatest of the shortages was in machine tools. Yet, although these new machine tools had to be built first with, and then equipped with ARMSTRONG TOOL HOLDERS; and although the building of numberless new dies, tools, jigs and fixtures required still other ARMSTRONG TOOL HOLDERS; and thousands of existing lathes, planers, slotters and shapers had to be "re-tooled" for new defense products; *no critical defense work has been held up for want of ARMSTRONG TOOL HOLDERS.*

Again the basic Armstrong Principle of Tool Design — the principle of permanent drop forged shanks or tool holders which take cutter-bits any mechanic can quickly grind from stock shapes of high speed steel, has proven equal to this greatest test. With multi-purpose ARMSTRONG TOOL HOLDERS in over 96% of the machine shops, tool rooms and plants the "change over" to defense work, instead of causing universal delay and confusion, was in each case a matter of minutes—a matter of selecting the ARMSTRONG TOOL HOLDER and the correct cutter, adjusting for clearance, and starting work.

ARMSTRONG BROS. TOOL CO.

"The Tool Holder People"

309 N. FRANCISCO AVE. CHICAGO, U. S. A.

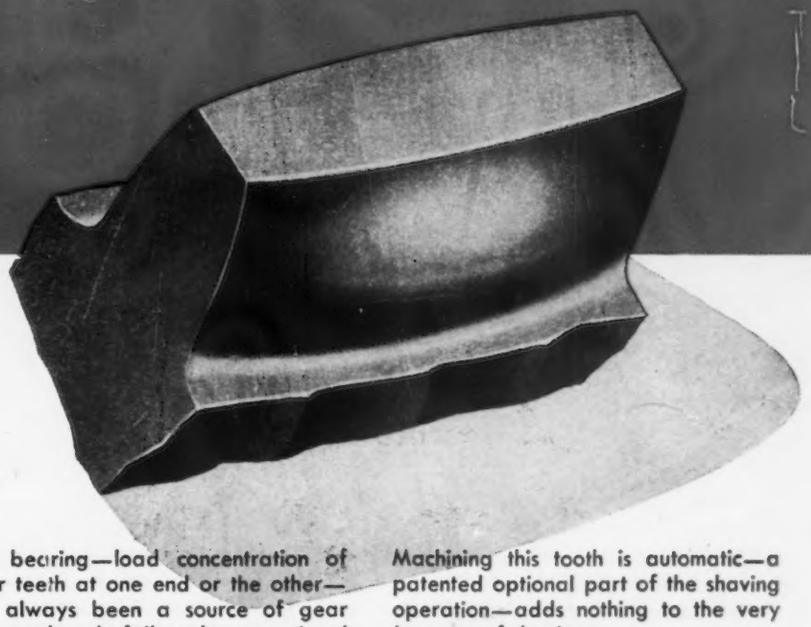
Eastern Warehouse and Sales:
199 Lafayette St., New York

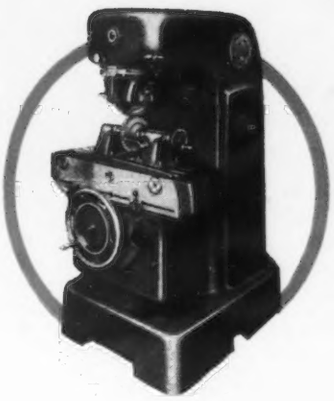
Buy ARMSTRONG TOOLS from your Supply House

ARMSTRONG TOOL HOLDERS Are Used in Over 96% of the Machine Shops and Tool Rooms

THE ELLIPTOID TOOTH FORM

Eliminates End Bearing—Solves Difficult Aircraft, Military & Naval Gear Problems





End bearing—load concentration of gear teeth at one end or the other—has always been a source of gear noise and early failure. In conventional gear practice it can be avoided only by extremely close tolerances—difficult and costly to maintain and which retard production rate.

Gear teeth given the Elliptoid Tooth Form on the Red Ring Rotary Gear Shaving Machine avoid end bearing. The Elliptoid tooth is thinner at the ends—thicker at the center or where-ever it is desired to locate the bearing.

Machining this tooth is automatic—a patented optional part of the shaving operation—adds nothing to the very low cost of shaving.

With this method, smaller, less costly gears will stand up better under the same loading. For example, Elliptoid gear replaces conventional bull gear increasing service life 400%. When used in same aircraft gearing, service life was increased 200%—in truck transmission it provided an increase of 300% in service life. Similar records made in many other cases.

Write for descriptive bulletins.

SPECIALISTS ON SPUR AND HELICAL INVOLUTE GEAR PRACTICE

ORIGINATORS OF ROTARY SHAVING AND ELLIPTOID TOOTH FORMS

NATIONAL BROACH AND MACHINE CO.

RED RING PRODUCTS

5600 ST. JEAN·DETROIT, MICH.

HEAVY striking power in the field is made possible by high production machines such as this Davis & Thompson Planer Type Milling Machine. Designed and built especially for the job of producing vital tank parts at a speed far in excess of requirements, this machine is typical of the many Davis & Thompson special high production metal-working machines.

This machine is a 54" x 60" x 10' Planer Type Milling Machine with 25 HP Milling Head. The milling spindle has 3 speeds and 18 inches of quill feed. Head and table feed is by means of a fluid drive motor with final feed through a feed screw. Spindle speeds and quill feeds are selective. All movements are electrically controlled, all moving parts, wherever practical, are automatically lubricated.

It can be furnished with double housing, with or without cross rail. Milling heads can be mounted on both columns and cross rail. Both table and head feeds can be engaged at the same time for profile milling. Heads can be mounted on swivel sub-bases for angular milling. Table feed is selective from one-half inch to 12 inches per minute, with a rapid traverse of 10 feet per minute.

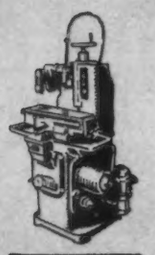
Write for more complete details of this and other Davis & Thompson High Production Machines.

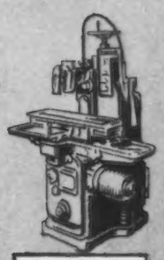
DAVIS & THOMPSON CO., MILWAUKEE, WIS., U. S. A.

DAVIS ROTOMATIC HIGH PRODUCTION MACHINERY

Engineered Production

Quick Set-Up
Sundstrand Automatic Lathes run on cycles of rapid approach, feed, quick return of 250" a minute. These are set up quickly and changed over easily by adjusting dogs on a graduated disc, as indicated at right. No cycle-control cams required.


No. 00 Rigidmil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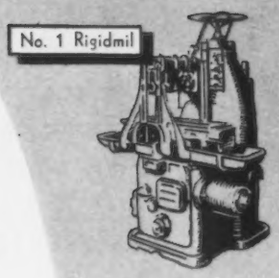
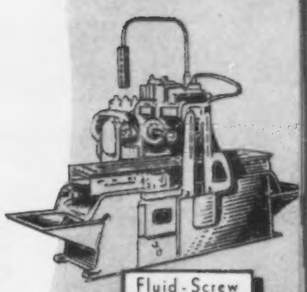

No. 1 Rigidmil

For Quick Facts

Get this booklet. See illustrated details of design and construction, 28 cycle diagrams, specifications and other data. Write *today*. Ask for Bulletin 505.


Fluid-Screw Rigidmil

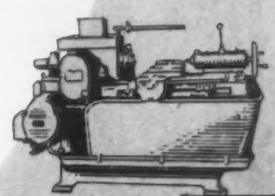
On Aircraft Engine Parts

142% Increase... Engineered Production and a Sundstrand Automatic Lathe increased output for turning operations on propeller shaft sleeves 142% over former method. This airplane engine part, run in lots of approximately 200, is made in nine different sizes each requiring a different set-up. The Sundstrand Automatic Lathe illustrated handles all nine sizes . . . is readily changed from one size, or job, to another. Quick set-up of cycle is outlined above. Establishing most efficient spindle speeds, feeds, and holding accurate sizes is equally simple. Additional Sundstrand Automatic Lathes in same plant show similar production increases on a wide variety of airplane engine parts turned in both small and large quantities.

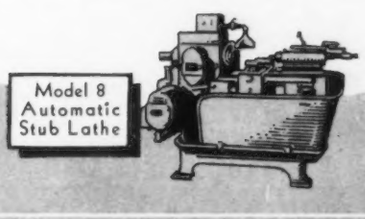
Why is this Possible?... Because the Sundstrand Automatic Lathe cycle control enables change-over from one job to another in 20 to 30 minutes. Thus the advantages of a fast automatic operating cycle, high rapid traverse rate of 250" per minute, and multiple tooling, all of which are necessary for maximum stock removal and high production, are available for short run work.

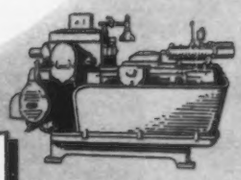
Close Limits at Less Effort... With a Sundstrand Lathe the operator only has to change work pieces and start the automatic cycle. The lathe does the heavy work and maintains uniformly close limits. Usually the operator can run two or more machines.

At Your Service... Airplanes, arms, ammunition, engines, ships, tanks, trucks, tractors, transport vehicles — no matter *what* war equipment you make, Sundstrand Automatic Lathes give you important proved and exclusive advantages on any metal-turning in their field. Our Engineered Production Department is at your service for making most effective use of these advantages. Simply send us accurate data on your turning requirements.


Model 12 Automatic Stub Lathe

Sundstrand Machine Tool Co.
2539 Eleventh Street, Rockford, Illinois, U. S. A.


Model 8 Automatic Stub Lathe


Model 10 Automatic Stub Lathe

In their respective fields, Sundstrand machine tools are unexcelled for high production, accuracy, and lasting value. Write for complete details.

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Hydraulic Operating Equipment — Drilling and Centering Machines

Your Product, too!

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WHATEVER THE SIZE △ □ ○ WHATEVER THE SHAPE

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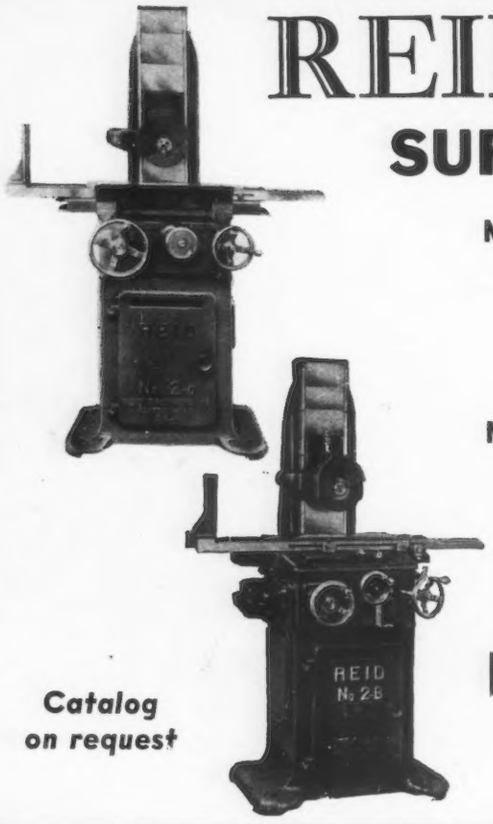

Model 2-C. Hand-Feed

A convenient machine tool, with all manual controls placed within easy reach. Bearing surfaces thoroughly protected by telescoping apron, attached to column. Work capacity up to 6x18x14 in. Table size 51x8 in. Spindle speed 3500 rpm.

Model 2-B. Automatic Feed

A precision machine tool, with reversible motor-driven spindle. Oil rollers on table and cross slides for proper lubrication. Chain actuated table instead of rack and pinion movement. Work capacity 6x18x14 in. Table size 51x8 in. Spindle speed 3500 rpm. Extra height may be had on standard machines.

Catalog on request

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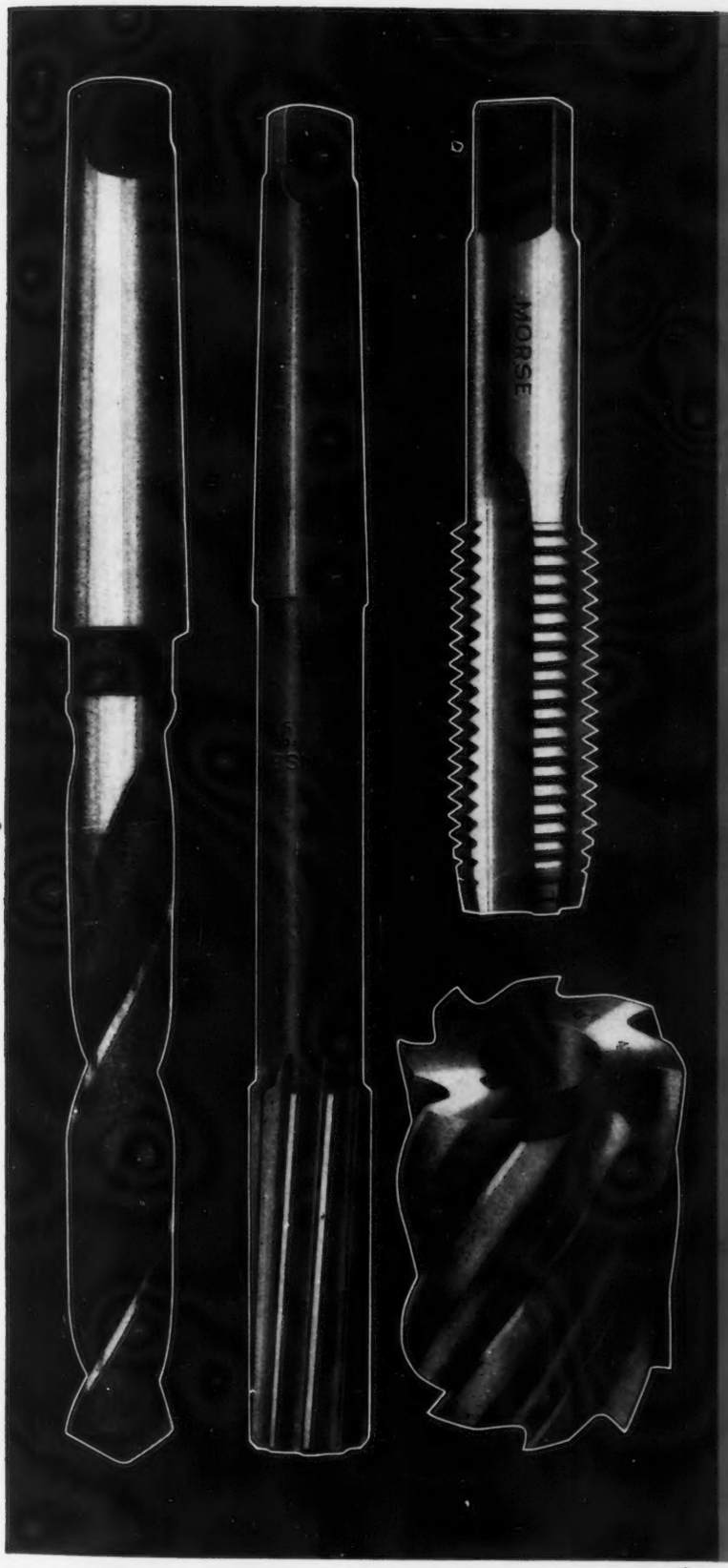

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The output of your machines is determined by the quality of the cutting tools you use.

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CORTLAND

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The mating faces of master rods for Pratt & Whitney aircraft engines, like other aircraft parts, are ground to the closest tolerances ever demanded in high production operations.

This stiff requirement is amply met on the grinding of flat surfaces by Cortland chuck and segment assembly. The shape of the segments produces a shearing action on the work which gives a finer finish—faster—and with less wear on the segments.

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CORTLAND GRINDING WHEELS CORP.

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"GET MORE OUT OF EXISTING FACILITIES!"

That's The Order of The Day in War Production

RIGHT R AND LEFT L Tools Will Help Do It...

If your existing facilities include turret lathes, automatic lathes, automatic screw machines, etc., you can easily get more work out of them by using R & L Tools.

The R & L Turning Tool does the work of 14 separate tools on turning, facing, drilling and other related operations. It's like adding a second turret. It enables you to perform more operations with smaller tool investment.

And the Universal Tool Post brings more tool points to the machining line on the front or back cross slide. In fact, all R & L Tools are designed to make your machine tools more efficient. That's why many machine tool builders have adopted R & L Tools as standard equipment on new machines.

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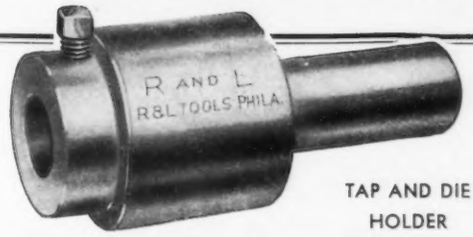
R AND L TOOLS

1825 BRISTOL STREET, Nicetown, Philadelphia, Pa.



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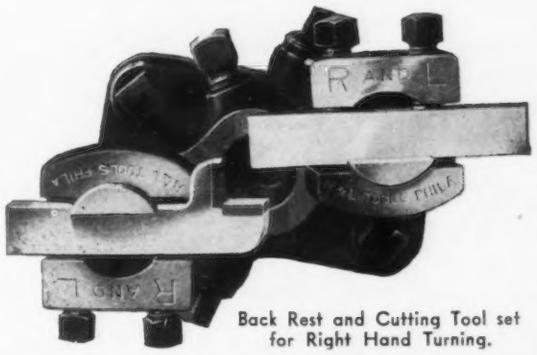
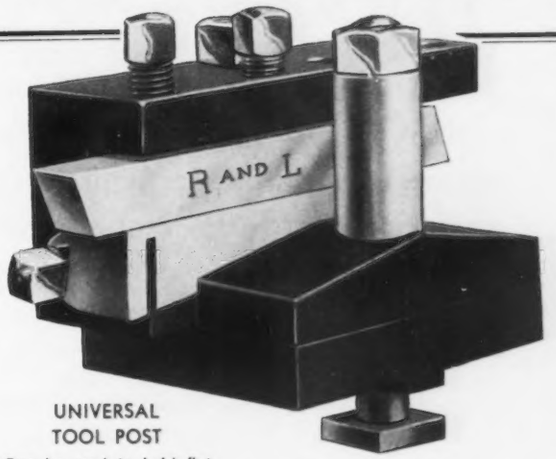
New design eliminates spring plungers and small screws. Engaging teeth separate fully — and instantly — when released, eliminating wear.



Back Rest and Cutting Tool set for Right Hand Turning.



UNIVERSAL TOOL POST

Can be used to hold flat or square tools on front or back cross slide with the spindle running either direction.

R & L TOOLS
1825 BRISTOL STREET . . . . . PHILA., PA.

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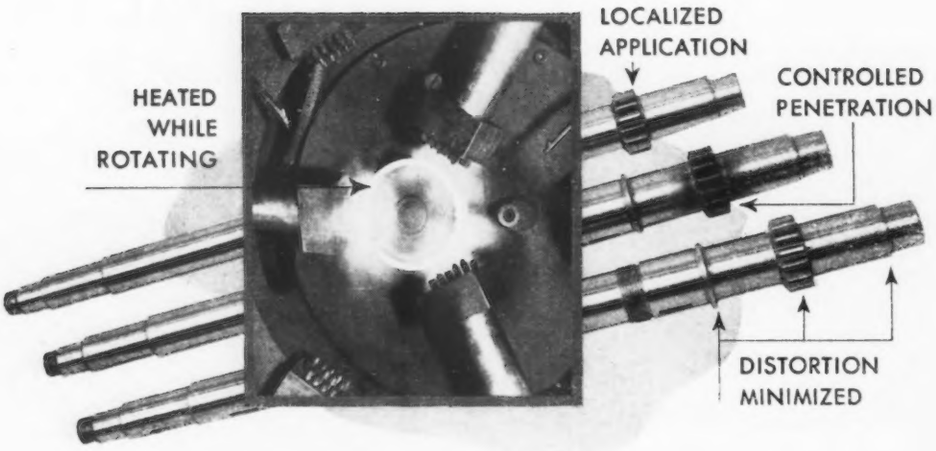

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Potential Cost Saving on Wide Variety of Work

The Fellows technique of localized hardening cuts manufacturing costs and improves the wearing quality of gears, shafts, cams and other parts. Essential surfaces are hardened to desired predetermined depth. The non-hardened part remains readily machineable if after-operations are necessary. Distortion is minimized, often virtually nil. Your own production problems will indicate where this Flame Hardening Machine might be applied. Capacity: parts up to 10½ inches diameter and 36 inches in length.

The shaft illustrated, on which only the integral gear is locally hardened, is produced at a saving of 33½ minutes over former methods. For further details, see "Sweet's" or write for circular on the "Fellows Flame Hardener". The Fellows Gear Shaper Company, Springfield, Vermont — or 616 Fisher Bldg., Detroit, or 640 West Town Office Bldg., Chicago.

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GEAR PRODUCTION METHODS

MACHINES AND TOOLS FOR ALL OPERATIONS FROM BLANK TO FINISHED GEAR

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ARMY E NAVY

Heald 3 POINT SERVICE
Keeps Production Rolling

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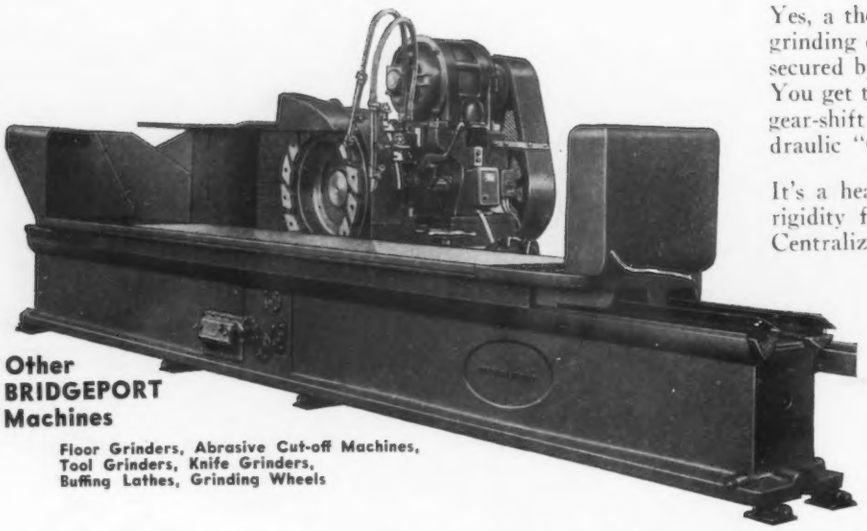
MANUFACTURERS OF PRECISION BORING AND PRECISION GRINDING MACHINES

The FACE GRINDER
With a Thousand Speeds!



Yes, a thousand speeds because in face grinding operations the best results are secured by using the right work speed. You get these speeds instantly, without gear-shift or clutch through the hydraulic "Oilgear" drive.

It's a heavy duty grinder with ample rigidity for both speed and accuracy. Centralized control. "Timken" roller bearing spindle with circulating lubrication.

The #85 grinder uses either a 32" or 36" dia. wheel. The #95 grinder has a 42" wheel, the #75 grinder a 26" wheel. Write for the complete story of this up-to-the-minute face grinder.

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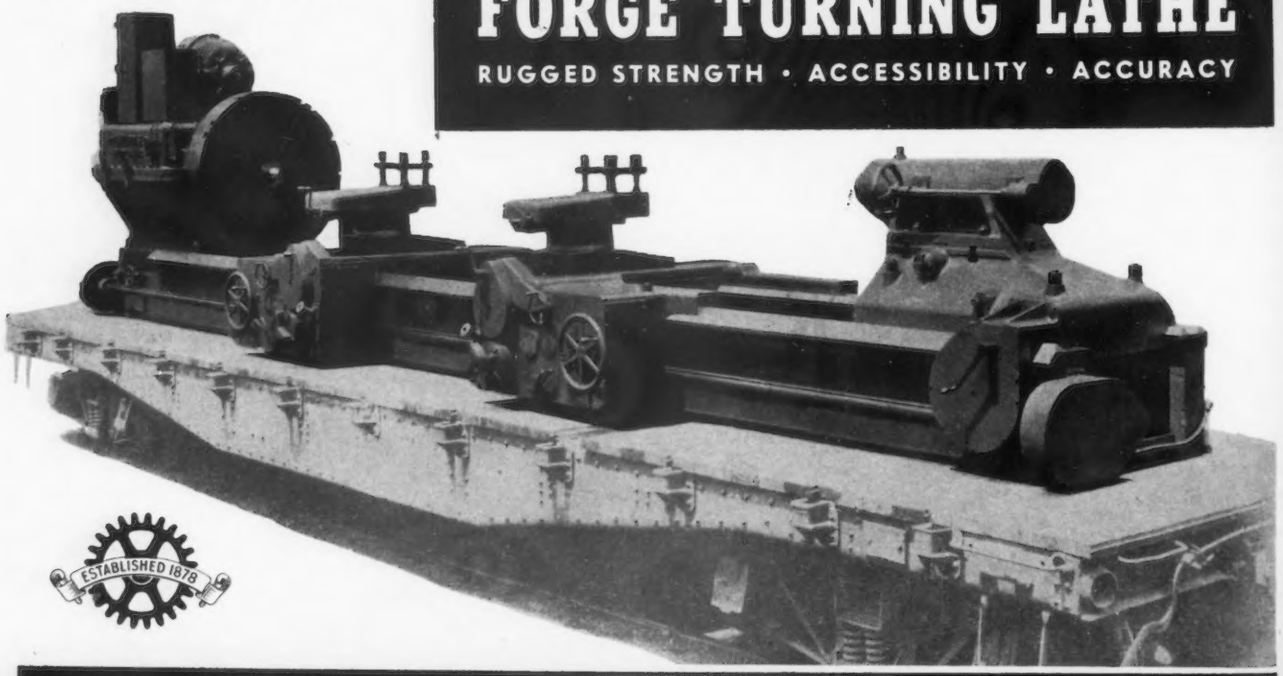

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the new, precision grinding wheel!

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6. Practically ends burning.
7. One man, one machine can do the work of 2 to 5.
8. Free cutting. Resists "loading" of soft materials.

See the trend to Por-os-way—introduced formally in Fortune Magazine, February, 1942.

*T. M. Reg. U. S. Pat. Off.

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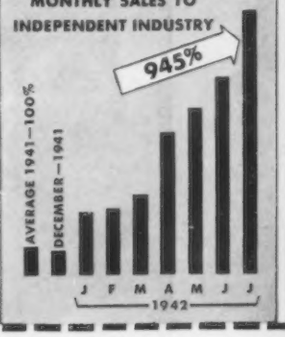

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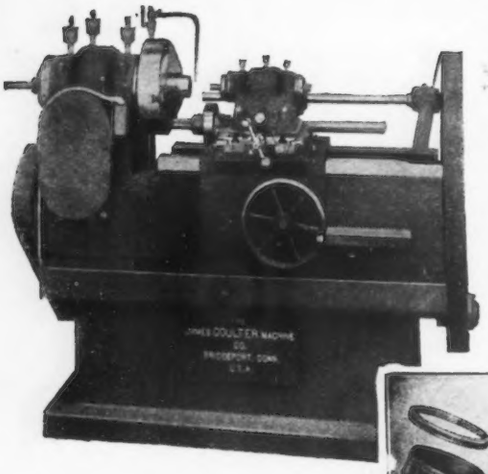

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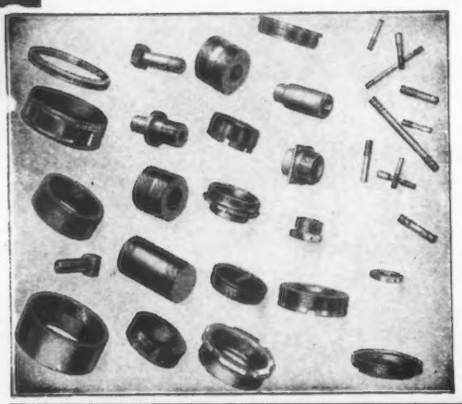

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HOB THREAD MILLER

Set cam-controlled automatic cycle on first piece. Thereafter, cutter feeds into work to proper depth and at correct pitch and withdraws when cut is completed. Work and cutter spindles are driven by individual motors through worm drive, affording ample power throughout the wide range of feeds and speeds.

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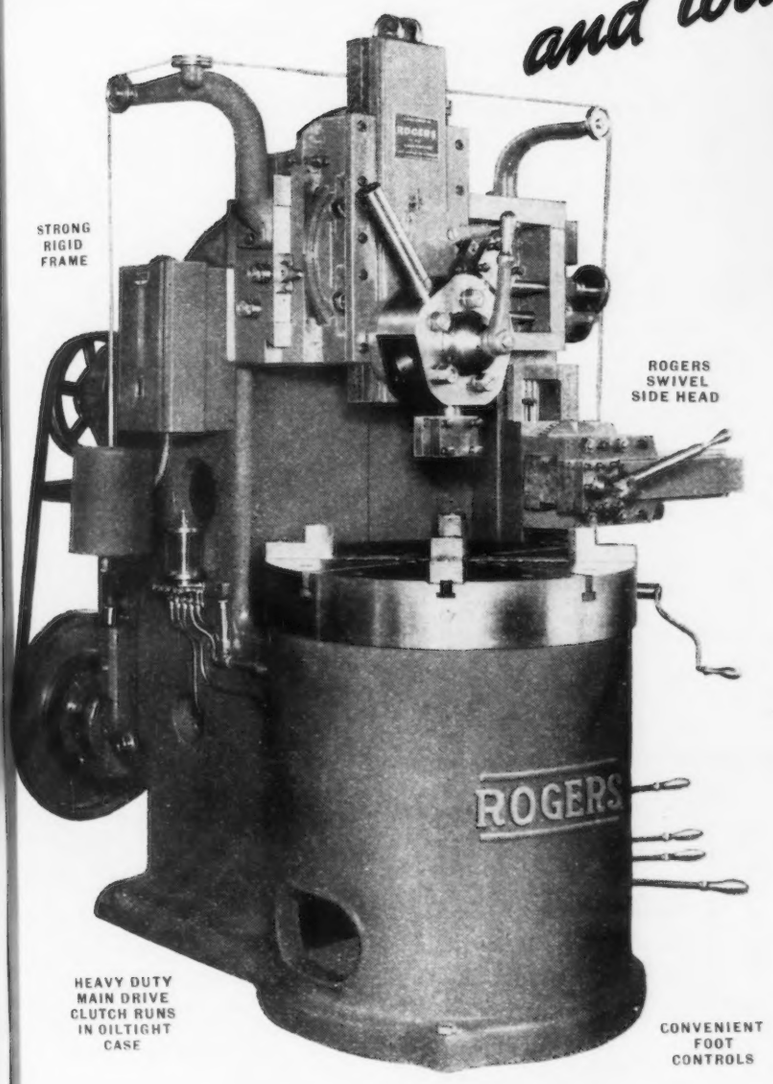
ROGERS "Perfect 36" VERTICAL TURRET MILLS ARE MAKING SURPRISINGLY QUICK DELIVERIES AT REAL ATTRACTIVE PRICES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ROGERS SWIVEL SIDE HEAD
ROGERS
HEAVY DUTY MAIN DRIVE CLUTCH RUNS IN OILTIGHT CASE
CONVENIENT FOOT CONTROLS

57 years of new developments and engineering achievements form the background of every Rogers Vertical Turret Mill delivered, installed and put into operation. These many years of experience in cooperation with the metal working industry have been climaxed by the Rogers "Perfect 36" Vertical Turret Mills (36" capacity).

Level chuck, special swivel side head, 5 position main turret, square side turret, rapid traverse, provide **quicker set-ups . . . more finished work per hour . . . closer tolerances in a minimum amount of operator's time and subsequent reduction of "down time."**

For faster, more accurate boring, drilling and turning large ferrous and non-ferrous castings, forgings and similar pieces, call on Rogers today and tomorrow to "Machine it on the Level."

Remember, Rogers is making surprisingly quick deliveries at very attractive prices.

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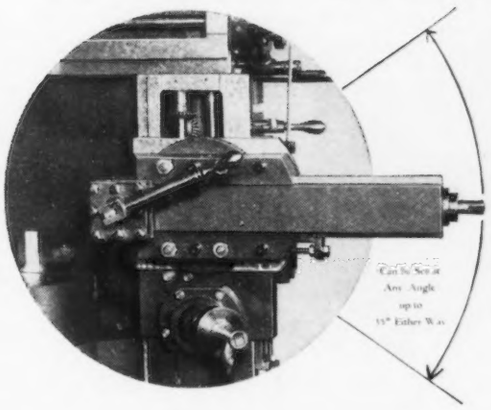

Universal adaptability of Rogers "Perfect 36" Vertical Turret Mills is further increased by the Rogers Swivel Side Head. This new development permits the side head to be set at any angle each side of vertical up to 35 degrees to facilitate tool setting for irregular shaped pieces.

Built-in graduated dial saves time in making set-ups for original and second runs.

Knowing How Since 1885

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- 36" diameter capacity.
- Side head sets at any angle up to 35 degrees each side of vertical.
- Table face to turret face 23" max. to 0" min.
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- Rapid traverse on main head.
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- Foot operated controls.
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with "DI-ACRO" PRECISION MACHINES

In illustration from left to right: Shear, Brake, Bender

Are you in a rush for some duplicated metal parts? Do you have experimental work? In many cases you can make the parts faster with the "Di-Acro" System, and avoid entirely the expense and delay of making dies. An almost unlimited variety of work can be rapidly done by the combined use of these 3 Di-Acro units. All duplicated work is accurate to .001". High hourly production rates can be easily maintained. Multiple units provide large output if desired.

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Di-Acro Shear squares and sizes material, cuts strips, makes slits or notches, trims duplicated stampings. Shearing width—Shear No. 1,—6". Shear No. 2,—9".

BRAKE

Di-Arco Brake forms non-stock angles, channels or "Vees". Right or left hand operation. Folding width—Brake No. 1,—6". Brake No. 2,—12". Brake No. 3,—18".

BENDER

Di-Acro Bender bends angle, channel, rod, tubing, wire, moulding, strip stock, etc. Capacity—Bender No. 1,—1/4" round cold rolled steel bar. See Bender No. 2 at right.

BENDER NO. 2 shown forming tube with accuracy to tolerance of .001" in all duplicated work. Capacity 1/2" round cold rolled steel bar.

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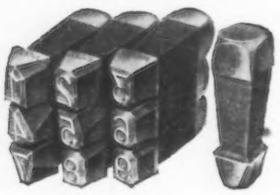
For all kinds of single character marking sizes 1/16" to 1/2" carried in stock.

WEDGE GRIP STYLE



For marking castings, tubes, etc. Knurled, Wedge Shapes Sides assures more safety.

BOX TYPE HOLDER

For marking slabs, billets, and many other flat, square, or angular products. Box levels Holder and assures even impression. Made for any size or number of characters.

WEDGE GRIP HOLDER

For marking gears, airplane and other machine parts. Patented Safety Snap provides quick change of type inserts.

NO. 1 HEAVY DUTY GEARED HEAD HAND MILLER

Available with Longitudinal Power Feed to Table

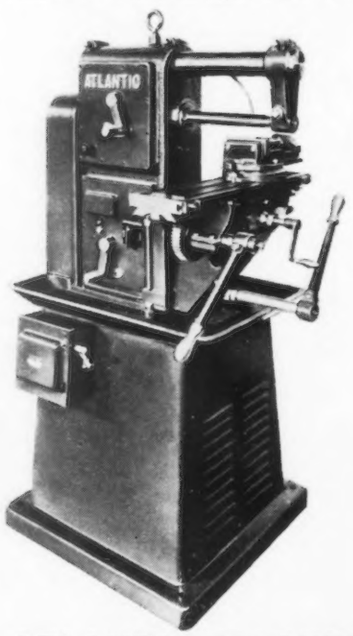


Table: 6"x24"
Capacity 5½"x8½"x18"

Geared Spindle Speeds —6 forward, 6 reverse. Optional spindle speed ranges available:

150-675 R.P.M.;
200-900 R.P.M.;
350-1350 R.P.M.

ANTI-FRICTION SPEED AND SPINDLE ASSEMBLIES.

Built in coolant pump and piping motor in base.

PROMPT DELIVERIES

ATLANTIC MACHINERY CORP.
149 BROADWAY, NEW YORK, N. Y.

National Acme CENTRIFUGE SAVINGS

FIT INTO YOUR WAR PRODUCTION PICTURE, TOO!

Centrifuge savings are applied to small shops like this and to hundreds of machines of all kinds employing thousands of gallons of coolants.

Machines take their worst beating when allowed to run with coolants and lubricants containing accumulated grit and other contamination. Merely separating chips and returning the coolant plus make-up is both unsafe and costly.

Clarification with a National Acme precision built centrifuge removes all the finely divided gritty materials, and tangible savings in any shop are these —

You grind and replace cutting tools less frequently.

A higher percentage of your product passes inspection.

Machine bearings and other operating parts show much slower deterioration.

You materially reduce both the quantities and costs of coolants and lubricants.

Our centrifuge engineers will freely show you the application best suited to your shop. *Complete Catalog, P-41.*

Destructive grit removed from coolant used one day.

NATIONAL ACME CO.

170 EAST 131ST STREET • CLEVELAND, OHIO

E-GRIDLEY 4-6 AND 8 SPINDLE BAR AND CHUCKING AUTOMATICS • SINGLE SPINDLE AUTOMATICS • AUTOMATIC THREADING DIES AND
• SCREW MACHINE PRODUCTS • THE CHRONOLOG • LIMIT SWITCHES • SOLENOIDS • POSITIVE CENTRIFUGE • CONTRACT MANUFACTURING

FREE-

TO USERS OF H&G DIE HEADS

Instruction

BULLETINS COVERING

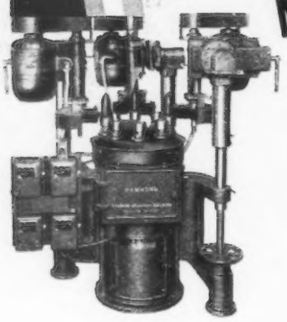
THE CARE OF GENERAL PURPOSE DIE HEADS
HOBBED CHASERS
GRINDING DATA ON INSERT CHASERS
STYLE MM (ROTARY) INSERT CHASER DIE HEAD
STYLE DMS INSERT CHASER DIE HEADS
STYLE DM INSERT CHASER DIE HEADS
STYLE TM TAPER CUTTING INSERT CHASER DIE HEAD
STYLES SAM AND SAMA SOLID ADJUSTABLE INSERT CHASER DIE HEADS
MODEL 1C THREADING MACHINE

In addition, as a part of our service we publish "DIE HEADLINES"—an informative bulletin packed with practical thread cutting suggestions for improving production, quality and volume. Give description of machine and size and style of H & G Die Heads used with your request.

The Eastern Machine Screw Corporation
21-41 Barclay Street **New Haven, Conn.**

★ PLANE PARTS
★ TANK PARTS
★ BOMB PARTS
★ SHELLS
★ GUN BARRELS

USE *Hammond* AUTOMATIC FINISHING MACHINES



MODEL-SB

ROTARY AUTOMATICS

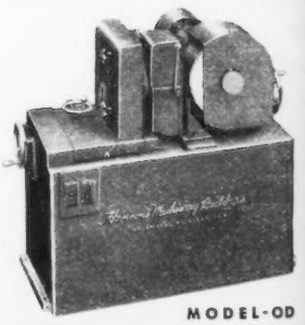
For BURRING, BRUSHING POLISHING, BUFFING of PLATED or BASE METALS

Step up production of Aircraft Engine Pistons, Valves, Hexnuts, Spark-plugs, etc.; Tank Track Pins, Engine Cylinder Liners, Carburetor parts, Gears, etc.; Shells and Shell Cases, Fuse Bodies, Fuse Caps, Striker Plates, Setting Sleeves, Timer Bodies, to name just a few of many items.

CYLINDRICAL FINISHING MACHINES

FOR 1/4" to 9" OUTSIDE DIAMETERS

Aircraft Landing Gear Parts, Universal Joint Shafts, Pistons, Cartridge and Shell Cases, Burster Tubes, Trench Mortar Bombs, Machine Gun Barrels, Throttle Shafts, Tubing and Rods present a few of the numerous uses of the "OD" Machine.



MODEL-OD

SEND SAMPLES TODAY FOR COMPLETE ENGINEERING REPORT

Hammond Machinery Builders INC.
1612 DOUGLAS AVENUE, KALAMAZOO, MICHIGAN
Eastern Branch, 71 West 23rd Street, New York City

PRESSING, FORMING AND WELDING

This revolutionary "all hydraulic" H-P-M open forging press has no steam boiler, accumulator or operating valves. Instead, press is completely self-contained and powered with an H-P-M hydraulic pump, mounted overhead. The 500-ton H-P-M FASTRAVERSE forging press illustrated above is installed at the Charleston Navy Yard. Write for details.

HPM

FASTRAVER
are FOR
implem

Parts for Guns, Ships, Shells, Aircraft and Tanks are produced faster and cheaper with H-P-M Self-contained Hydraulic Forging Presses.

H-P-M forging presses are being widely used for die forging, open forging, piercing and drawing operations. In all instances, H-P-M presses proved far superior to the previously used mechanical or ordinary hydraulic forging machinery. There are many reasons why—

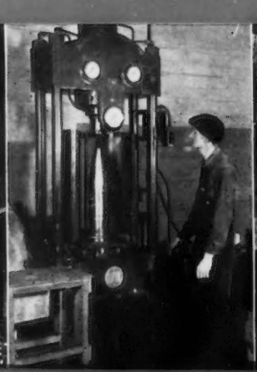
LOW FIRST COST: *No auxiliary equipment such as accumulators, intensifiers or steam boilers are required. Only one foundation is necessary. Valuable floor space is saved as well as the cost of heavy foundations.*

OPERATING COSTS REDUCED: *Power consumption is less due to the efficiency of the H-P-M radial, piston type, hydraulic pump. The powerful steady squeeze of the H-P-M FASTRAVERSE press accomplishes more work per press stroke, thus more work per day. This is possible because the pressing force is not limited by gravity fall, as is the case with drop hammers.*

HPM

SELF-CONTAINED HYDRAULIC PRESSES

are the accepted Standard for all types of Metal Pressing Applications



CARTRIDGE CASE

SHELL NOSING

SHELL TESTING

GUN STRAIGHTEN

VERSE PRESSES
FORGING the
ments of War!

Two H-P-M FASTRAVERSE presses are used to forge high explosive shells. Press illustrated above pierces the hot slug; second press (not shown) draws the slug to the proper length and section. Only one heat is required. Average production for one line of two presses is in the neighborhood of three thousand 90 mm shell forgings every 24 hours. Final rejections low, averaging only 2-1/2% of the total production. Write for details.

BETTER QUALITY FORGINGS: *The structure of the metal is refined at considerable depth due to the kneading action of the H-P-M "High Frequency Hydraulic" method. There are fewer die forging rejects because press is reversed at a predetermined pressure, thus eliminating all guess work.*

MINIMUM MAINTENANCE COST: *There are fewer working parts. No operating valves. Lubrication is automatic. Oil is used as a pressure medium. The exclusive H-P-M closed circuit operating system provides for smooth press operation with shockless reversal.*

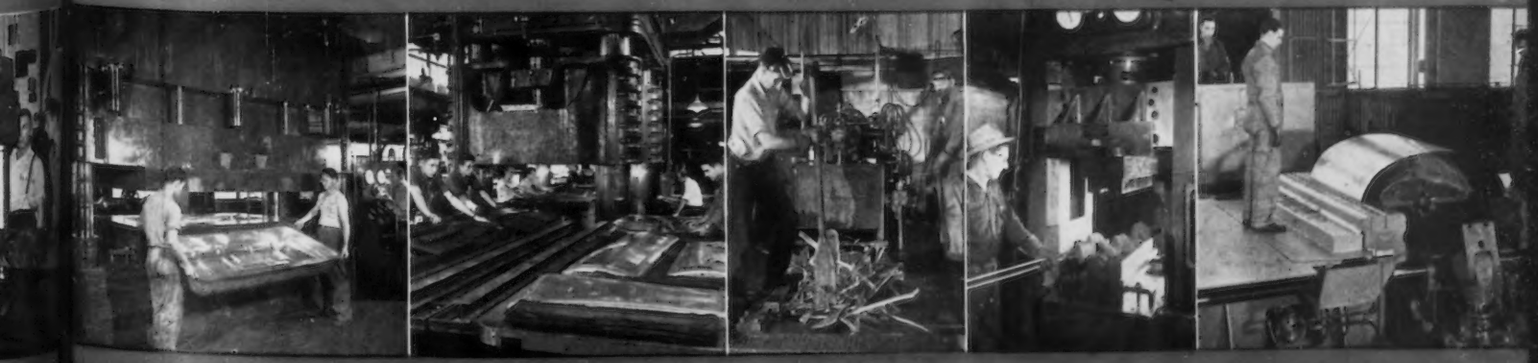
Forge the modern way—with H-P-M FASTRAVERSE presses. They are cheaper—better—faster. Write today stating your requirements.

Bulletin 4206-I describes in detail all types of H-P-M FASTRAVERSE metal working presses. Schematic die drawings illustrate press actions. All descriptive copy has been condensed to a practical reading minimum. A list of standard sizes will assist in choosing the correct press for each production requirement. Write today for your copy of Bulletin 4206-I. There is no obligation.

THE HYDRAULIC PRESS MFG. CO.

Mount Gilead, Ohio, U. S. A.

District Sales Offices: New York, Syracuse, Detroit and Chicago. Representatives in Principal Cities.



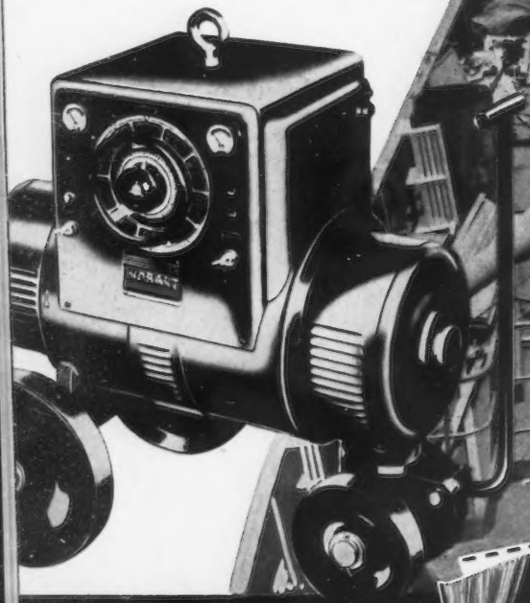
SHEET METAL DRAWING | RUBBER PAD FORMING | SCRAP BALING | DIE STRAIGHTENING | SHEET METAL STRETCHING

Here's production at top speed with HOBART "Simplified" ARC WELDING setting the pace.

It takes a high priority rating and a mighty essential "end use" classification to get reasonably prompt delivery of Hobart Arc Welders these days, even with expanded facilities producing 15 times normal volume!

Shipyards, Tank Arsenals, Aircraft Factories, Ordnance Plants, and other Vital Industries are fighting to get Hobart Arc Welders to help speed production and increase output. That's why the number of customers we supply is limited.

When the war is over, however, the wartime lessons learned—and the wartime record accumulated by Hobart Arc Welders — can mean only THOUSANDS of enthusiastic new Hobart Users. "Keep Your Eye on Hobart!"



HOBART "SIMPLIFIED" ARC WELDING

● **The Hobart Brothers Co., Box 1A-102, Troy, Ohio**

Gentlemen: We are interested in lower cost welding. We can furnish priority rating _____. Please give us data checked.

- ☐ Electric Drive Welder
- ☐ Gas Drive Welder
- ☐ Best possible shipment
- ☐ Electrodes
- ☐ Send me _____ copies of Hobart Welding Manual

$2.00 Postpaid

NAME _____

POSITION _____

FIRM _____

ADDRESS _____

Check Above to order your copies

One of the world's Largest Builders of Arc Welders and Equipment"

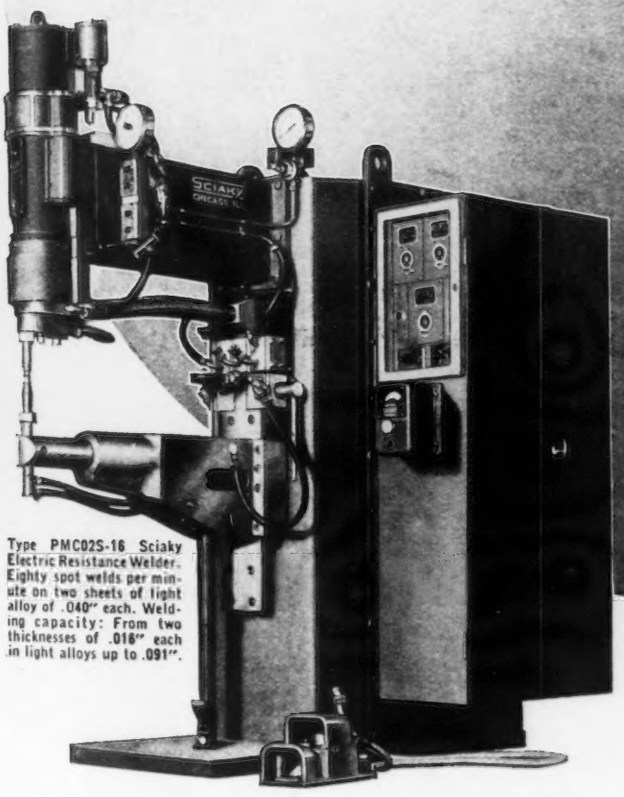
BUY STORED ENERGY

WITH *Preheating*

AND

VARIABLE PRESSURE

WITH *Precompression*



Type PMC02S-16 Sciaky Electric Resistance Welder. Eighty spot welds per minute on two sheets of light alloy of .040" each. Welding capacity: From two thicknesses of .016" each in light alloys up to .091".

ONLY SCIAKY CAN GIVE YOU THESE EXCLUSIVE FEATURES

WRITE FOR DESCRIPTIVE LITERATURE

SCIAKY BROS.
Manufacturers of a Complete Line of D.C. and A.C. Electric Resistance Welding Machines
4915 W. 67TH ST., CHICAGO, ILL.

PARTIAL LIST OF USERS

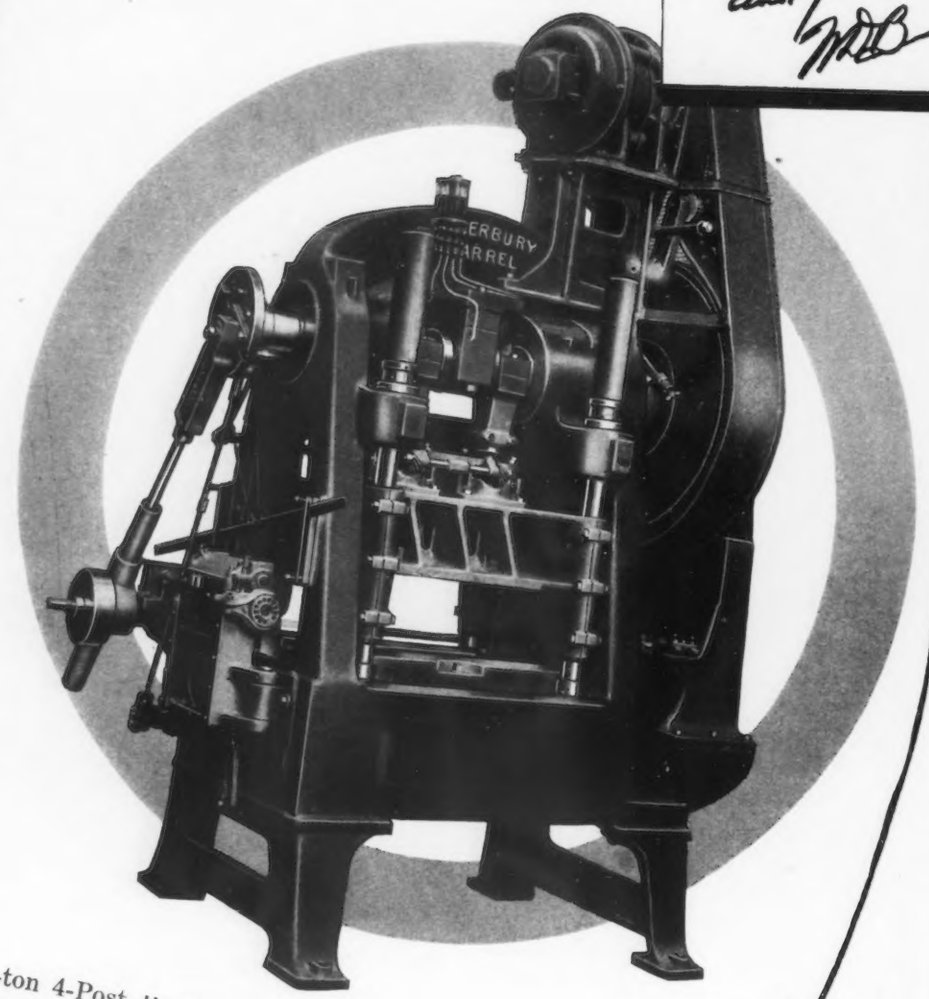
AIR ASSOCIATES, INC.
BEECH AIRCRAFT CORP.
BELL AIRCRAFT CORP.
BELLANCA AIRCRAFT CORP.
BENDIX CORP.
BOEING AIRCRAFT CO.
BREWSTER AERONAUTICAL CORP.
BRIGGS MFG. CO.
CHRYSLER CORP.
CONSOLIDATED AIRCRAFT CORP.
CURTISS-WRIGHT CORP.
DOUGLAS AIRCRAFT CO., INC.
FAIRCHILD ENGINE & AIRPLANE CORPORATION
FORD MOTOR CO.
GENERAL AIRCRAFT EQUIPMENT CORPORATION
GENERAL MOTORS CORP. (EASTERN AIRCRAFT)
GOODYEAR AIRCRAFT CORP.
GRUMMAN AIRCRAFT ENG. CORP.
HUGHES AIRCRAFT CO.
LOCKHEED AIRCRAFT CORP.
THE GLENN L. MARTIN CO.
NATIONAL STEEL CAR CO.
NEW YORK SHIP BUILDING CORP.
NOORDUYN AVIATION, LTD.
NORTH AMERICAN AVIATION, INC.
PULLMAN STANDARD CAR MFG. CO.
RYAN AERONAUTICAL CO.
UNITED AIRCRAFT CORP.
UNITED STATES ARMY
UNITED STATES NAVY
VULTEE AIRCRAFT, INC.

SCIAKY

PROCESS ELECTRIC RESISTANCE WELDING
STORED ENERGY · VARIABLE PRESSURE
WITH PREHEATING · WITH PRECOMPRESSION

FOUR-POST BLANK
PRESSES.

MEMO
Check this—
get sizes
and prices—
MB



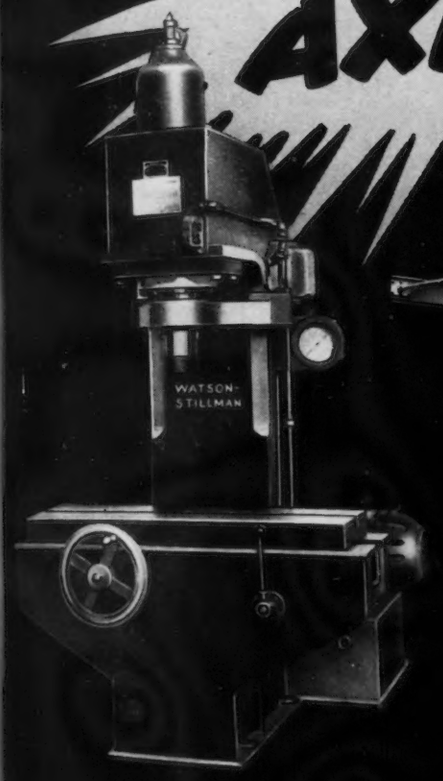
60-ton 4-Post Precision Blanking Press for quantity production at high speeds. Post Guides for the gate and a shock-absorbing flywheel are two of the many features which contribute to the efficient operation of these presses.

Post-Guiding—a patented Waterbury-Farrel design—is the ultimate in maintained tool alignment; it reduces wear and shear, thus minimizing tool grinding and replacement. *Greater production at less unit cost!*

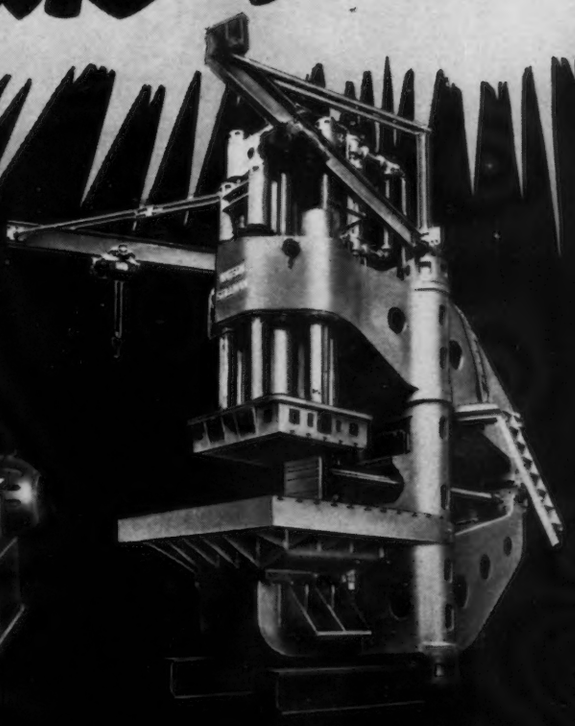
Waterbury Farrel Foundry and Machine Company
Waterbury, Connecticut, U. S. A.

CLEVELAND · CHICAGO · NEWARK, N. J.

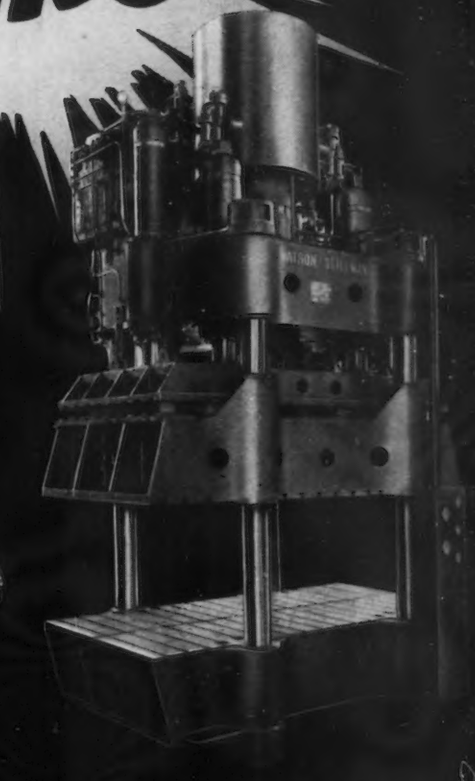
Their Job today is AXIS BUSTING



W-S PRESS HELPS MACHINE-GUNNERS SHOOT STRAIGHT



METAL WORKING MAMMOTH HELPS SHIP PROGRAMS



800-TON W-S PRESS . . . FOR BETTER BOMBERS

These giant W-S Presses "hit 'em hydraulically" by land, sea and air

Barrels for lead-spitting machine guns... flange plates for storm-riding fighting ships . . . metal parts for devastation-dealing bombers . . . that's the kind of production Uncle Sam asks for and *gets* today. It's the type of vital work that Watson-Stillman Presses are turning out—in the day shifts and night shifts of America's Axis-busting war plants.

This wide range of service illustrates the scope of the W-S line of hydraulic equipment. It emphasizes not only the versatility of many individual types of presses, but also the resourcefulness and "know-how" which are built up year after year in the course of a near-century of hydraulic experience.

Working closely with plant engineers has long been the privilege of Watson-Stillman. In the adaptation of existing equipment to new needs or in the design of new machines for special purposes, many such engineers have found this service of practical help. Feel free to consult Watson-Stillman on any technical problem involving hydraulic equipment.

★ ★ ★ ★

To bring your reference library up to date, ask for your free copy of the recently published Bulletin 120-A, a publication packed with information, tables, formulae, etc. A letter on your business stationery brings you this piece of engineering literature. Simply address Watson-Stillman Co., Roselle, N. J.

2718

WATSON-STILLMAN

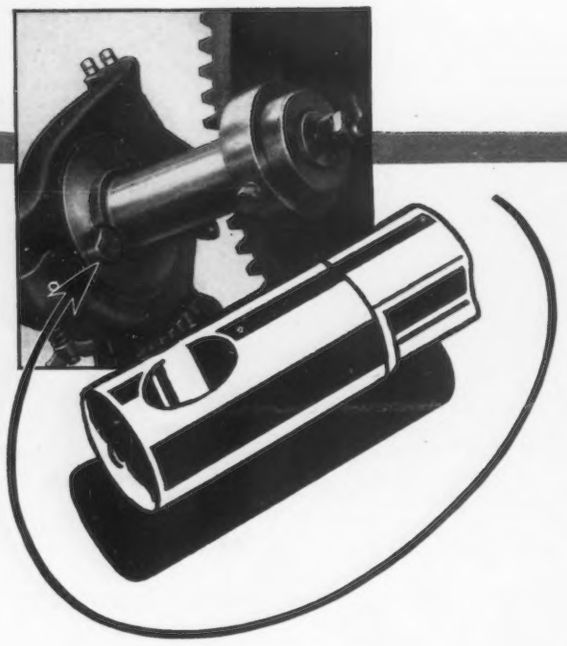
Engineers and Manufacturers of Hydraulic Machinery and Equipment — Hydraulic Presses, Pumps and Jacks, Forged Steel Valves and Fittings.

FERRACUTE'S *PLUS VALUES*

are now paying off

in PRODUCTION

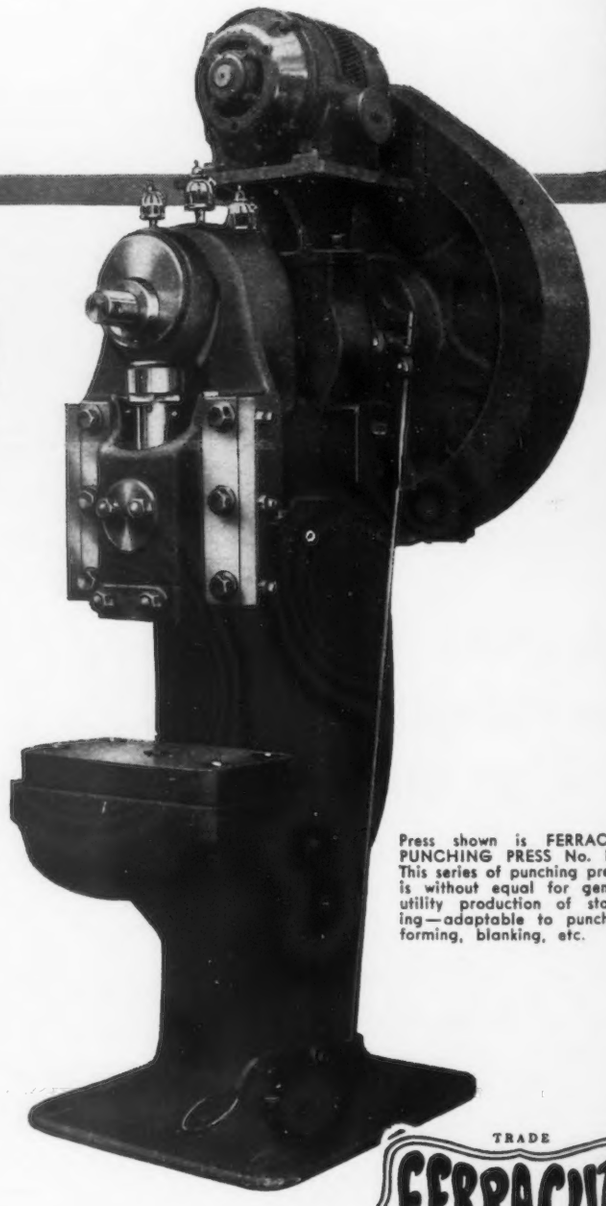
Once they may have seemed like salesman's talking points—those "plus values" of FERRACUTE presses—but now that American war industry approaches the pay-off hour, they are paying off in PRODUCTION. FERRACUTE's **extra** engineering details, **extra** standards of strength of materials, **extra** safety factors, **extra** guards against breakdowns, **extra** ease of adaptability—all are triply important now that something EXTRA is essential for continuous, uninterrupted war production that is punishing to men and machines. And sometimes a little **extra** knowledge will help improve the performance of even FERRACUTE presses.



WATCH DOG OF PRODUCTION

The Driving Dog on the FERRACUTE Automatic Pin Clutch is a watch dog of production, designed to prevent costly breakdowns and long shutdowns for repairs. Made of Alloy Steel, carefully heat-treated, the Dog or Clutch Slide will give you years of service under normal conditions. It is designed, however, to break when the press is dangerously overloaded—thus preventing more serious damage to press, dies, or to operator. The Slide is easily replaced since it is round and can, in an emergency, be made in any machine shop.

The FERRACUTE Automatic Pin Clutch is typical of the "plus values" engineered into FERRACUTE presses. It is safe, sure, quickly adaptable, low in maintenance delays.



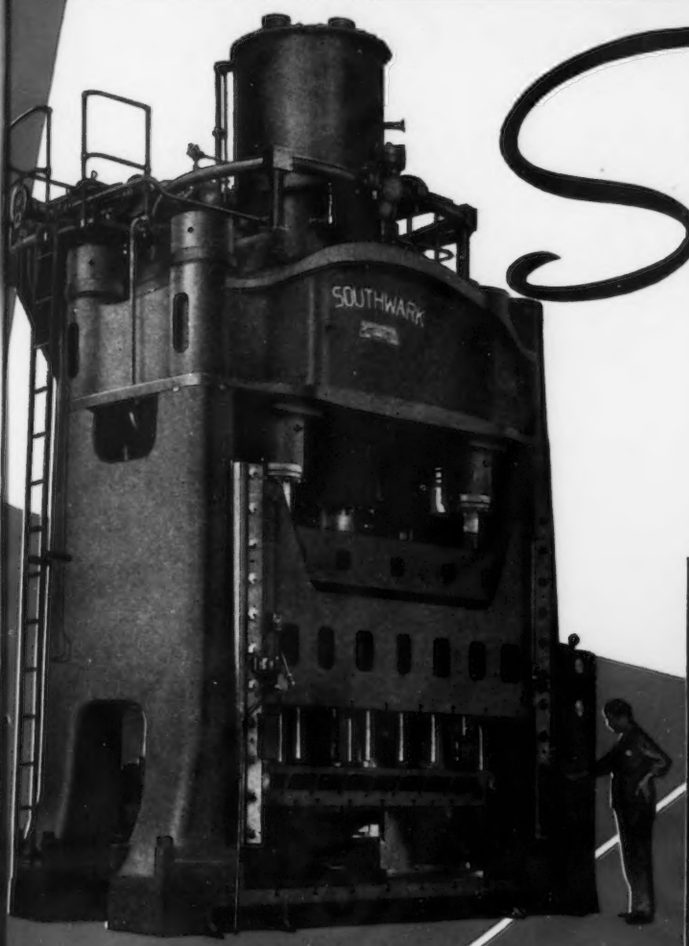
Press shown is FERRACUTE PUNCHING PRESS No. P 4. This series of punching presses is without equal for general utility production of stamping—adaptable to punching, forming, blanking, etc.

FERRACUTE'S
MACHINE COMPANY
Bridgeton, N. J. U. S. A.

TRADE FERRACUTE MARK

SERVING AMERICA'S WAR INDUSTRIES

Southwark



for

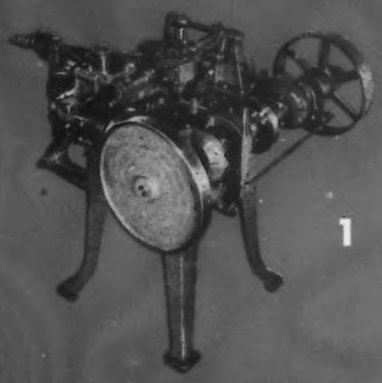
HYDRAULIC PRESSES
and
SPECIAL MACHINERY

Baldwin Southwark

DIVISION OF
THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

BLW
THE BALDWIN GROUP

NILSON
WIRE AND METAL FORMING MACHINES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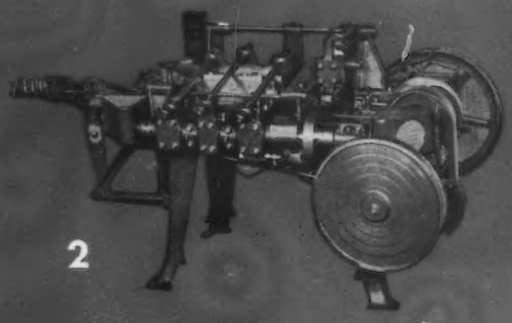
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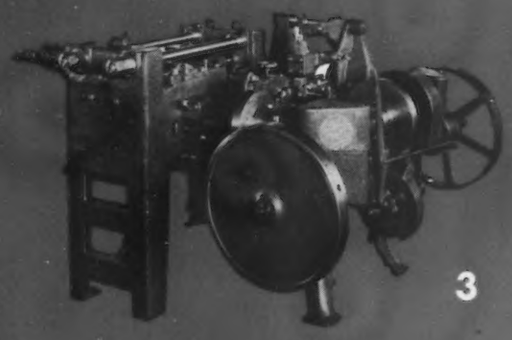
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4

From Coil Stock to Formed Parts in a Jiffy on a Single Machine

How many different formed parts are being made throughout the country from wire up to 1/4" dia. and from strip metal up to 2 1/2" wide?

The answer is "thousands," and many of those you make are within these sizes.

Nilson makes efficient forming machines for these classes of formed work. Machines which are positive in automatic straightening and feeding, fast in operation, and easy to tool up. For example:

1. Ten sizes of Nilson standard 4-slide Wire Forming Machines up to 1/4" wire and 30" length of feed.

2. Four sizes in the S-F series of Nilson combination Press and 4-slide Forming Machines for flat stock up to 2 1/2" wide and wire up to 1/4" dia. These machines combine a die set with the four forming slides.

3. Two sizes in the S-T series of Heavy Duty Forming Presses. This is a general purpose metal forming machine with the die set operating in a horizontal plane for easy accessibility, simple set up and quick operation.

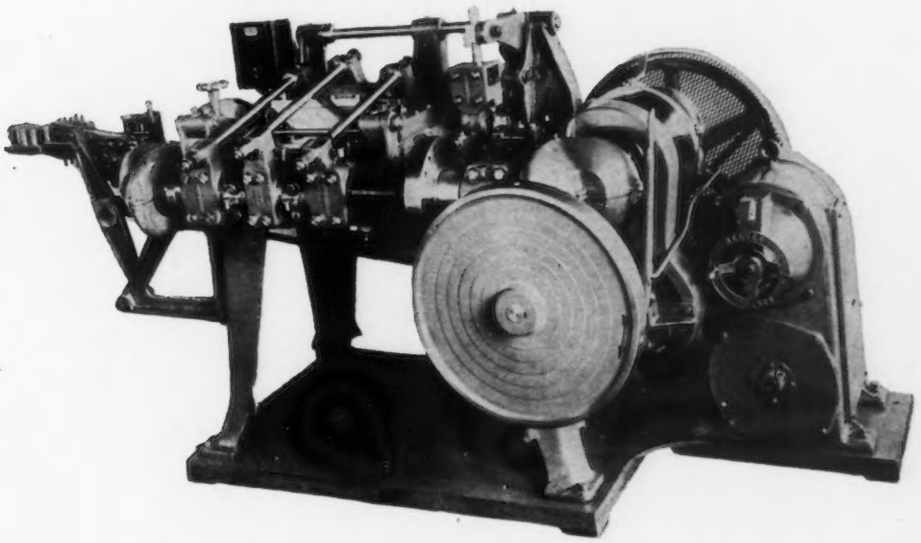
4. Send for Bulletin No. 60 describing all these machines and other Nilson products such as Reels, Staple Forming Machines.

THE
A. H. NILSON
MACHINE COMPANY
Bridgeport, Conn., U. S. A.

NILSON

Automatic Machinery

for Swaging, Stamping, Piercing, Blanking, Forming of Coiled Metal



KEEP your Defense Production humming with Nilson automatic machinery. Nilson machines turn out the work faithfully, accurately and speedily. No bottlenecks where these machines are used.

The Nilson line includes machines for forming paper clips, buckles, gate hooks, coat and hat hooks, ceiling hooks, wire ears, cable rings, screw eyes, sash chains, automobile side chains, flat open link chains, staples, cotter pins, hose clamps, etc. Nilson also makes wire straighteners, wire reels, frame bending machines and special presses.

Nilson has and will play a very important part in your Defense Production.

THE A. H. NILSON MACHINE CO.
BRIDGEPORT, CONN., U. S. A.

These 1000 ton Lake Erie Hydraulic Presses installed in one of America's largest warplane plants are typical of the many Lake Erie installations throughout industry . . . throughout America . . . throughout the United Nations.

★ ★ ★ ★ ★ ★ ★ ★ ★

this LAKE ERIE

WAR PRODUCTION BOARD

is helping Uncle Sam fight to Victory

Daily Sessions of this Lake Erie War Production Board expedite production. Left to right around desk are O. Hoffman, Chief Engineer; John Doty, Plant Supt.; C. S. Davis, Jr., Production Promotion; Robert E. Dillon, President and General Manager; H. D. Thweatt, Sales Manager.

Long prior to December 7th, Lake Erie Hydraulic Presses had their baptism of fire in speeding production of war materiel in the United States, Canada, England, Russia, China, Australia and South America.

Standardization + Simplification = SPEED!

Lake Erie's War Production Board has one objective,—to speed up deliveries of Lake Erie Hydraulic Presses. Standardized designs . . . maximum utilization of patterns . . . machining technique dovetailed with assembly practice . . . all are adding up to better presses, FASTER.

Manufacturers producing warplanes, ordnance, naval and merchant ships are doing it better and SOONER with Lake Erie Hydraulic Presses . . . Single, double and triple action units for blanking, drawing, forming, coining, bending, straightening, extruding and practically every other pressing operation are built in capacities up to 23,000 tons.

The Lake Erie War Production Board is at your service all the way from inquiry . . . to delivery . . . to installation. Put it up to Lake Erie!

LAKE ERIE
ENGINEERING CORP.
BUFFALO, N.Y. U.S.A.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★

IT'S THE OFFENSE THAT WINS BATTLES

Since 1940, the Nazis have won battle after battle. Why? Because they've waged one offensive after another.

ALTER EGO: Yes, but they've been able to do that. They started their *war production offensive* 10 years ago so they had a big edge on us in tanks, planes and guns. Then we really started competing.

So competition forces progress. *Look how in two years, our* production offensive *has already surpassed that of the Axis—turning out better weapons and more of 'em. These new arc welded M-4 tanks, for example. They'll soon be in our fighting offensive.*

ALTER EGO: It's thrilling but don't let it get us complacent. Haven't we learned never again to be caught unprepared in war . . . or in *business competition* either?

There you have it! Let's start TODAY waging a planning and designing offensive *so we'll be on the alert with better welded products and lower costs to get the upper hand on our competition the minute the post-war Battle for Business begins!*

Ask your inner self if it isn't the offense that wins battles.

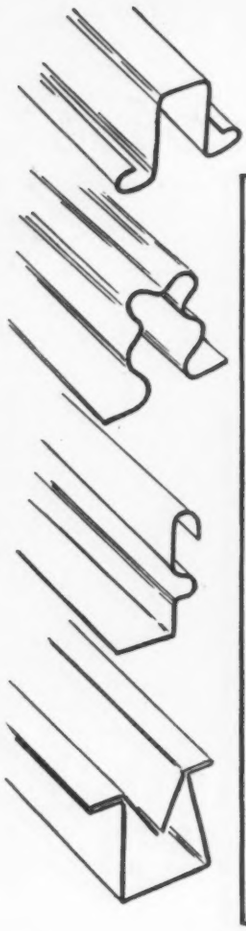
THE LINCOLN ELECTRIC COMPANY
CLEVELAND, OHIO

then I said to myself—

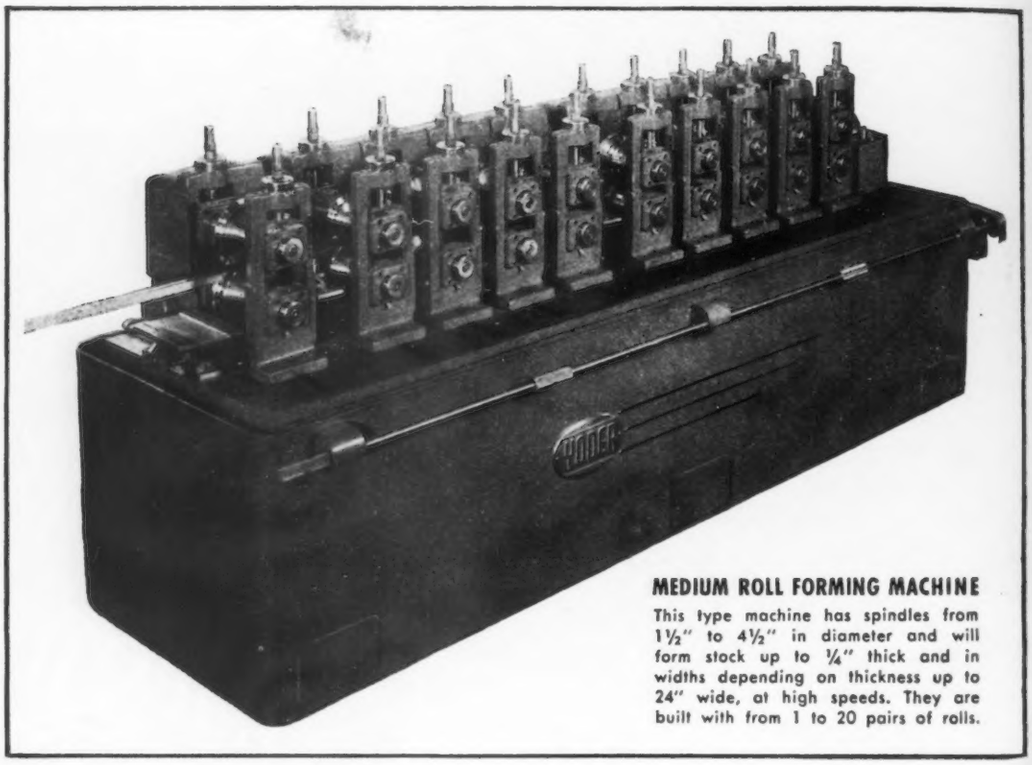
IT'S A GREAT JOB —WELD DONE!

ARC Pledge
WE HEREBY PLEDGE ALL OUR RESOURCES, MAN POWER AND EQUIPMENT, TO THE CEASELESS PRODUCTION OF QUALITY, STAINLESS AND ALLOY ELECTRODES FOR FASTER WELDING OF MORE EQUIPMENT FOR OUR FIGHTING FORCES.
ARMORARC
ARCALOY
ALLOY RODS COMPANY
Stainless and Alloy Electrodes
YORK, PENNSYLVANIA

PERHAPS YODER ROLL FORMING CAN HELP!



"The business of war competes only with time in the race to meet the emergency of the nation's needs."



MEDIUM ROLL FORMING MACHINE

This type machine has spindles from 1½" to 4½" in diameter and will form stock up to ¼" thick and in widths depending on thickness up to 24" wide, at high speeds. They are built with from 1 to 20 pairs of rolls.

Getting into production in a rush . . . maintaining a high level of quality production in the face of stringent labor shortages . . . new ways, new uses, new qualities added . . . these and many additional positive advantages of Yoder Roll Forming are more than enough to stimulate the imaginations of designers and to stir the pulse beat of many a production manager in these days of stress.

The Yoder Company is a pioneer designer of Roll Forming Machinery. We have constantly made good on our slogan, "You get the improvements first from Yoder." As a result, new high standards of performance are constantly being established.

Steadily Yoder has added to the large variety of metals and alloys that can be "Roll Formed" on our machines.

(Hot and cold rolled steel, stainless steel, bronze, brass, copper, zinc, aluminum and high strength alloys, are most of the materials one could wish to "Roll Form".)

A multiplicity of shapes can be Roll Formed.

(Tubing, moulding, angles and channels words can't begin to describe the limitless variety of shapes that can be produced.)

A wide range of sizes is covered by the complete line of Yoder Roll Forming Machines. Also, each machine is designed to produce the greatest range with dee regard to efficient operation.

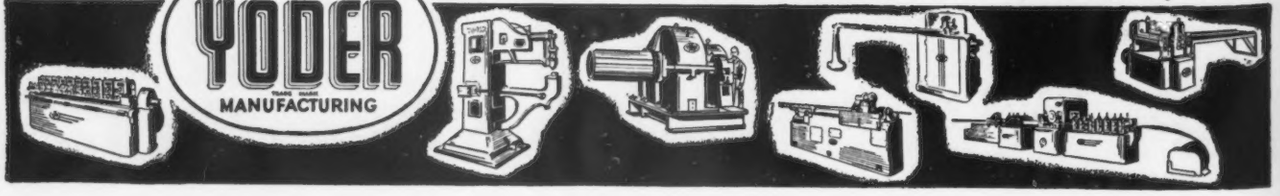
We have a catalogue of the complete line of YODER METAL FORMING PRODUCTION EQUIPMENT. Yours for the writing.

Buy War Bonds

METAL • FORMING • PRODUCTION • MACHINERY

ENGINEERING YODER MANUFACTURING

THE YODER COMPANY • CLEVELAND, OHIO



When bigger Hammers were needed

Erie Was Ready With Them!

BIGGER Planes, Tanks, Guns, Ships demand bigger forgings . . . bigger hammers. By using one piece drop forgings for complete structural sections, previously fabricated by joining many small parts, *production time* and *man-hours* are being reduced . . . Erie Drop Hammers have grown bigger *ahead of the job.* Thus the foresight of Erie Engineers and Craftsmen in stepping up hammer sizes and capacities adds a mighty wallop to assure the successful completion of America's big job in Logistics.

Erie's complete facilities are devoted to war work.

ERIE

Throw Your Scrap into the Fight!

ERIE FOUNDRY COMPANY
ERIE, PENNSYLVANIA, U.S.A.

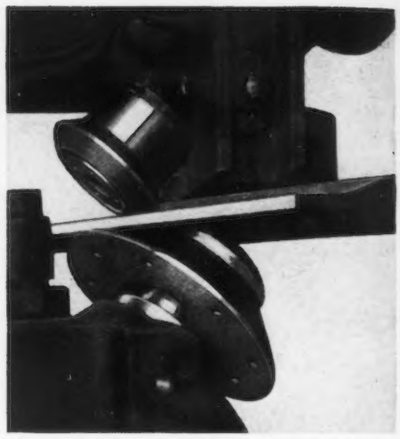
DETROIT 335 Curtis Bldg. · CHICAGO 549 Washington Blvd. · INDIANAPOLIS 336 Postal Station Bldg.
AUSTRALIA Associated Machine Tools · CANADA John Bertram & Sons Co. Ltd. · ENGLAND Burton, Griffiths & Co., Ltd.

ERIE BUILDS *Dependable* HAMMERS

Don't Wait for a New Machine use your QUICKWORK for JOGGLING

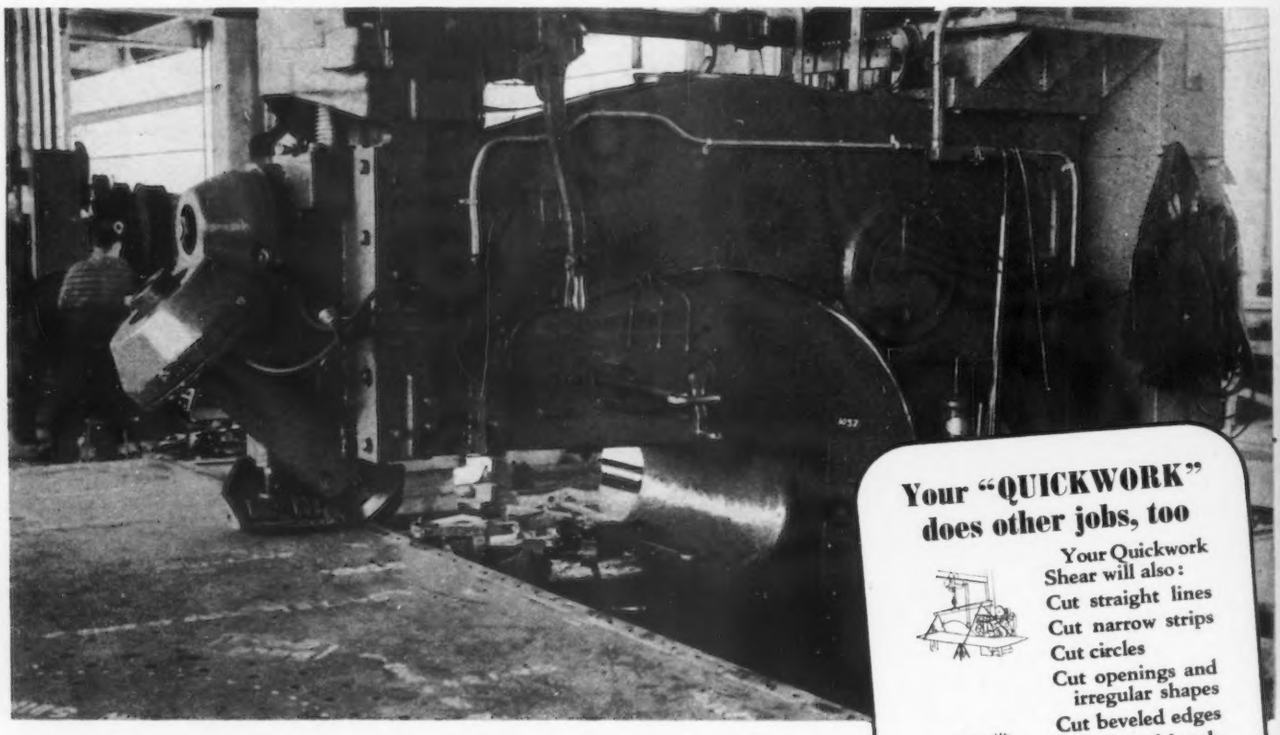
If you own a Quickwork Rotary Shear, whatever its original purpose, you can quickly put it to work joggling any type of sheet within the range of its capacity. For general work or straight production, your Quickwork-Whiting Shear with joggling attachment joggles straight or irregular shapes, inside or outside curves at high speeds. Uniformity of the joggled lap throughout the entire length of the work is assured.

Save delay—investigate the special attachments that make your Quickwork-Whiting Rotary Shear the most versatile tool in any shop.



Above: Close-up of joggling operation showing joggled plate emerging from the rolls. Joggling rolls are adjustable for different metal thicknesses and are quickly interchangeable with standard cutters. Joggling operation can be done either before or after the beveling operation.

Write for your copy of the new Quickwork-Whiting Special Auxiliary Attachments Bulletin.



Your "QUICKWORK" does other jobs, too

Your Quickwork Shear will also:
Cut straight lines
Cut narrow strips
Cut circles
Cut openings and irregular shapes
Cut beveled edges
Flange and joggle
Make clean cuts without burrs—in a single pass at high speeds.

Don't wait for a new machine. Use your Quickwork.

"QUICKWORK"

WHITING

Division of Whiting Corporation, 15601 Lathrop Ave., Harvey, Illinois

IT IS POSSIBLE...

...that one of the reasons why we are so busy is that we have been known for years as builders of *good* hydraulic presses and equipment. At any rate, we have long been working night and day

in producing as many presses as possible...without deviating from our normal high standards of sound design

and careful workmanship.

Even though we might not be able to fill your hydraulic press requirements on short notice, our engineers will be glad to cooperate,

to the limits of their available time, in helping you solve your press

problems.

★

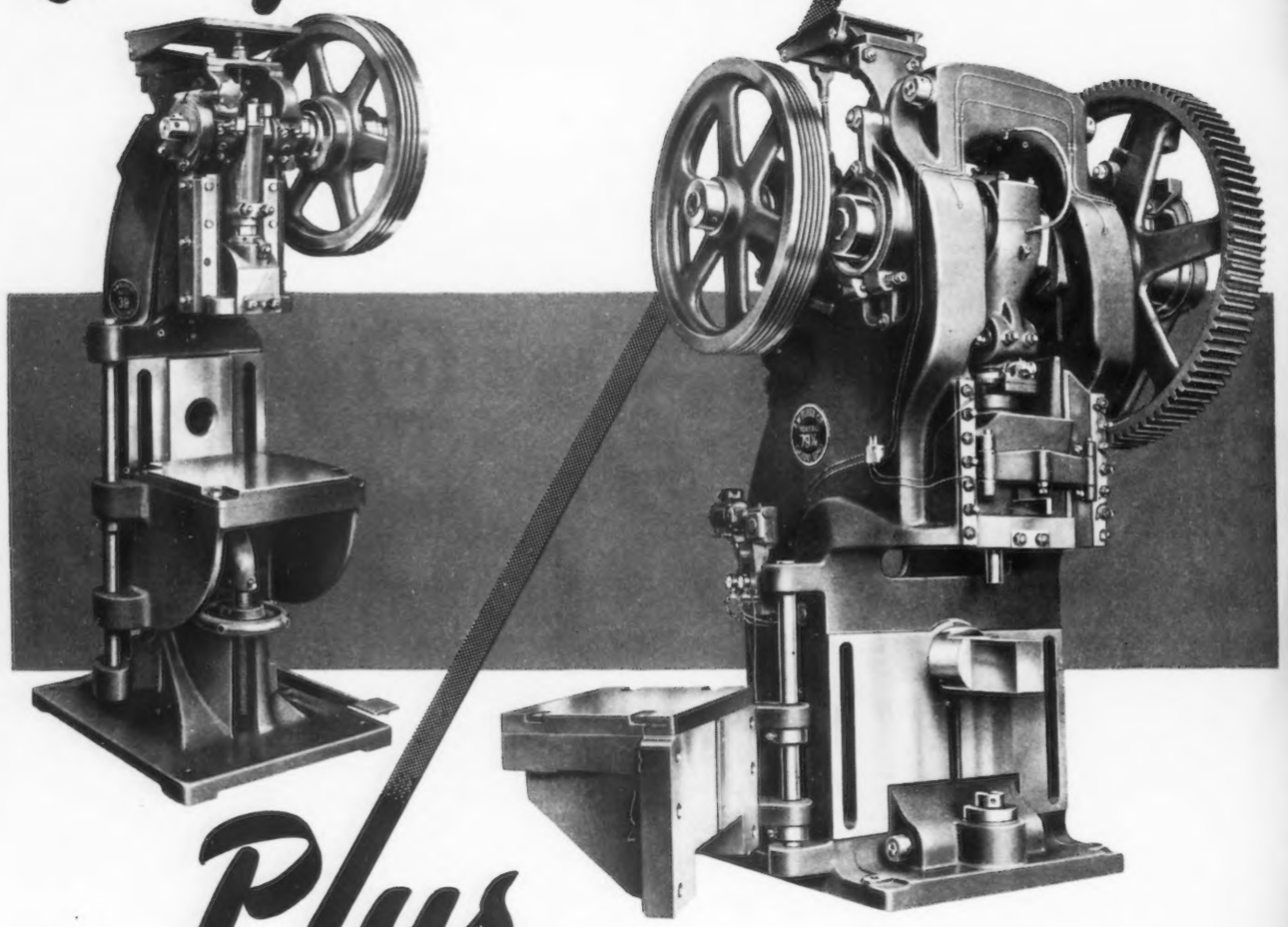
BENDING PRESSES • CRIMPING PRESSES • DEHYDRATING PRESSES • DIE SINKING PRESSES • DOUBLE ACTING PRESSES • DRAWING PRESSES • FORCING PRESSES—VERTICAL AND HORIZONTAL • FORGING PRESSES • FORMING PRESSES • JOGGLING PRESSES • LABORATORY PRESSES • LAMINATING PRESSES • PLATE FLANGING PRESSES • SCARFING PRESSES • SECTIONAL FLANGING PRESSES • PRESSES FOR FORGING, DRAWING, PIERCING AND TESTING OF SHELLS • STRAIGHTENING PRESSES • UPSETTING PRESSES • SPECIAL PRESSES

HYDRAULIC PRESSES FOR EVERY PURPOSE

R. D. WOOD CO.

PHILADELPHIA • PENNSYLVANIA

Adaptability



Plus

Inherent in **Horn Press Construction** through eighty odd years of Bliss Engineering Experience is adaptability to meet varying manufacturing conditions.

Adjustable beds for use with dies of different heights. **Horns** for seaming, bending, punching or riveting.

Overhanging frame, making possible the use of special fixtures and tools bolted to finished front of press frame.

Bliss Horn Presses serve many purposes in metal working operations and exemplify the economy in purchase and operation of Bliss engineered equipment.

MARQUETTE · BLISS · TOLEDO · CONSOLIDATED · BLISS BUILT

E. W. BLISS CO.

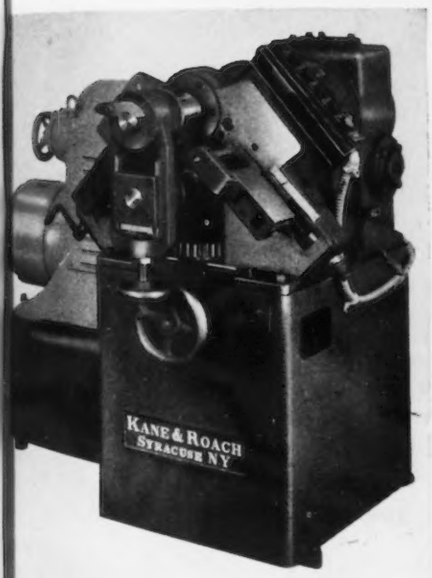
53d Street and Second Avenue

BROOKLYN · NEW YORK

BLISS

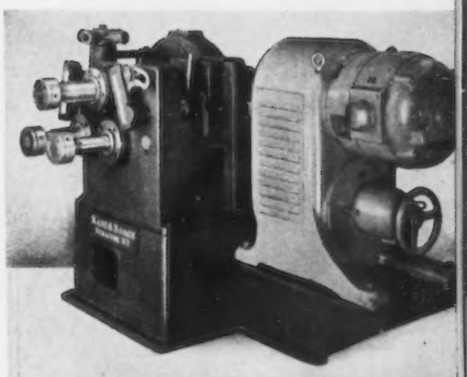
KANE & ROACH

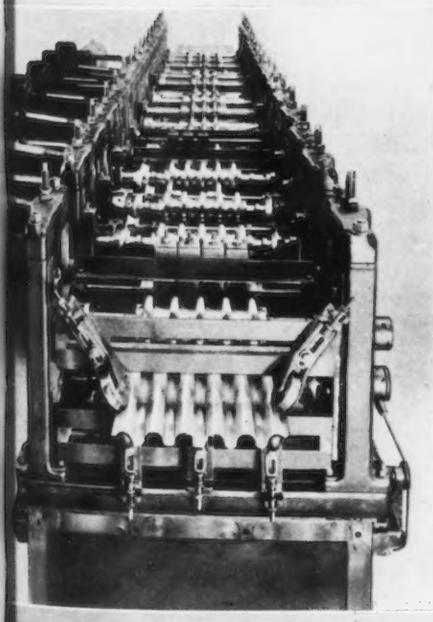
PRODUCTION EQUIPMENT FOR AIRCRAFT BENDING AND FORMING

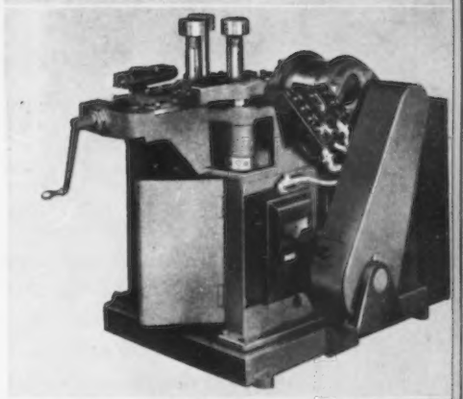


The Kane & Roach machines shown here are used by leading aircraft plants for many of their sheet metal forming operations; also many structural shape and tube bending operations. Their special features have been developed by Kane & Roach especially to meet the requirements for speed and accuracy in the production of aircraft parts. Similar standard and special K & R Machines can fit into your production plans, adding speed and efficiency to your bending and forming jobs in aircraft and ordnance manufacture. Write for engineering suggestions.

STRAIGHTENING ROLLS
BENDING ROLLS
COLD ROLL FORMING MACHINERY
GANG SLITTERS
SPECIAL METAL WORKING EQUIPMENT



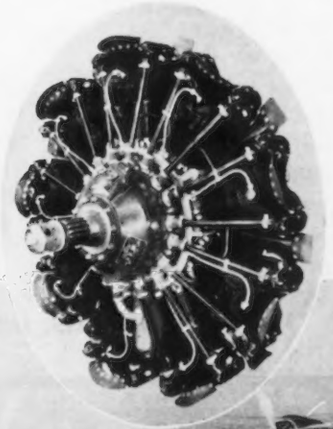




KANE & ROACH, INC.

Established 1887

SYRACUSE, NEW YORK



MALLORY STANDARDIZED WELDING ELECTRODES

SPEEDIER PRODUCTION

BETTER WELDING

LESS DOWN TIME

LOWER COST

Resistance Welding Wins Its Wings By Speeding Aircraft Production

One reason why American fighters and bombers have earned their high reputation in sky-battles . . . and why their output has increased so hugely in recent months . . . is the increased use of resistance welding. In many leading aircraft plants, airplanes are built *faster*, more economically, lighter in weight and with improved design . . . thanks to standardized spot welding tips and holders, seam welding wheels and flash welding dies supplied by Mallory.

During the past three years, resistance welding with Mallory Standardized Welding Electrodes has revolutionized aircraft assembly methods. Before 1940, only such non-structural parts as switch boxes, air ducts, cover plates, map cases, ammunition boxes and radio antenna masts were resistance welded. Secondary structures such as engine and nacelle cowlings, fairings by the wings and fuselage between stabilizer and elevator, door and window frames, fuselage bulkheads and pilot seats were soon successfully spot welded. Today, there is a growing list of additional aircraft parts . . . many of them primary stressed structures . . . which are speeded to completion in resistance welding machines.

It's natural, because of Mallory's pioneer developments in better electrode materials, designs, holders and cooling methods, that Mallory Resistance Welding Electrodes are specified by welding engineers in major aircraft plants all over the country. Mallory Standardized Spot Welding Tips, for instance, will give you more spots between dressings . . . a far higher total number of welds before replacement is necessary . . . and stronger, cleaner welds at low cost.

Ask MALLORY engineers to help you specify the correct resistance welding electrode for each job. Also, you'll want your free copy of the fact-filled MALLORY RESISTANCE WELDING DATA BOOK. Write us today!

P. R. MALLORY & CO., Inc., INDIANAPOLIS, INDIANA • *Cable Address*—PELMALLO

RESISTANCE WELDING P.R. MALLORY & CO. Inc. MALLORY **STANDARDIZED ELECTRODES**

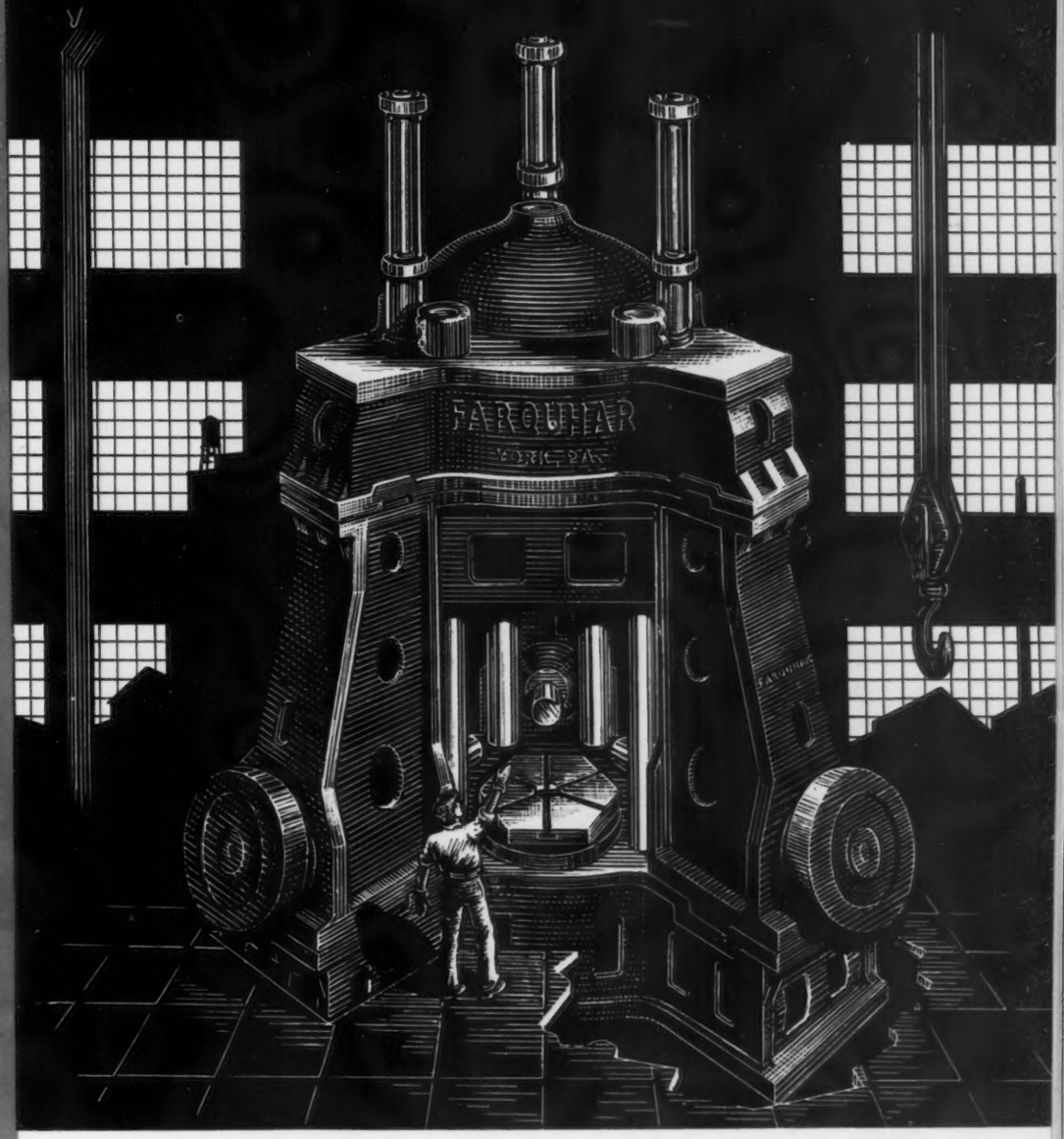
28% VIRGIN METAL SAVED WITH THIS FARQUHAR HYDRAULIC PRESS

his propeller hub forging weighs approximately 372 pounds. When machined to form the finished hub shown in the bottom illustration, the average machining loss of virgin metal is 316 pounds.

To produce the same hub this forging weighs approximately 267 pounds, 105 pounds less than the top forging. Out of a ton of virgin metal seven hubs can be forged instead of five. 40% more hubs.

By proper forging and extrusion in the 7200 ton Farquhar Hydraulic Press the forging shown in the second illustration takes this form, ready for machining and still weighing only 267 pounds.

Here's the finished product. Weight approximately 56 pounds. The identical propeller hub is obtained by forging and extrusion, then machining of a 267 pound forging, as from direct machining of a 372 pound forging. Thus 28% in metal is saved for other hubs . . . plus the added advantage of fewer rejects and less machining time.

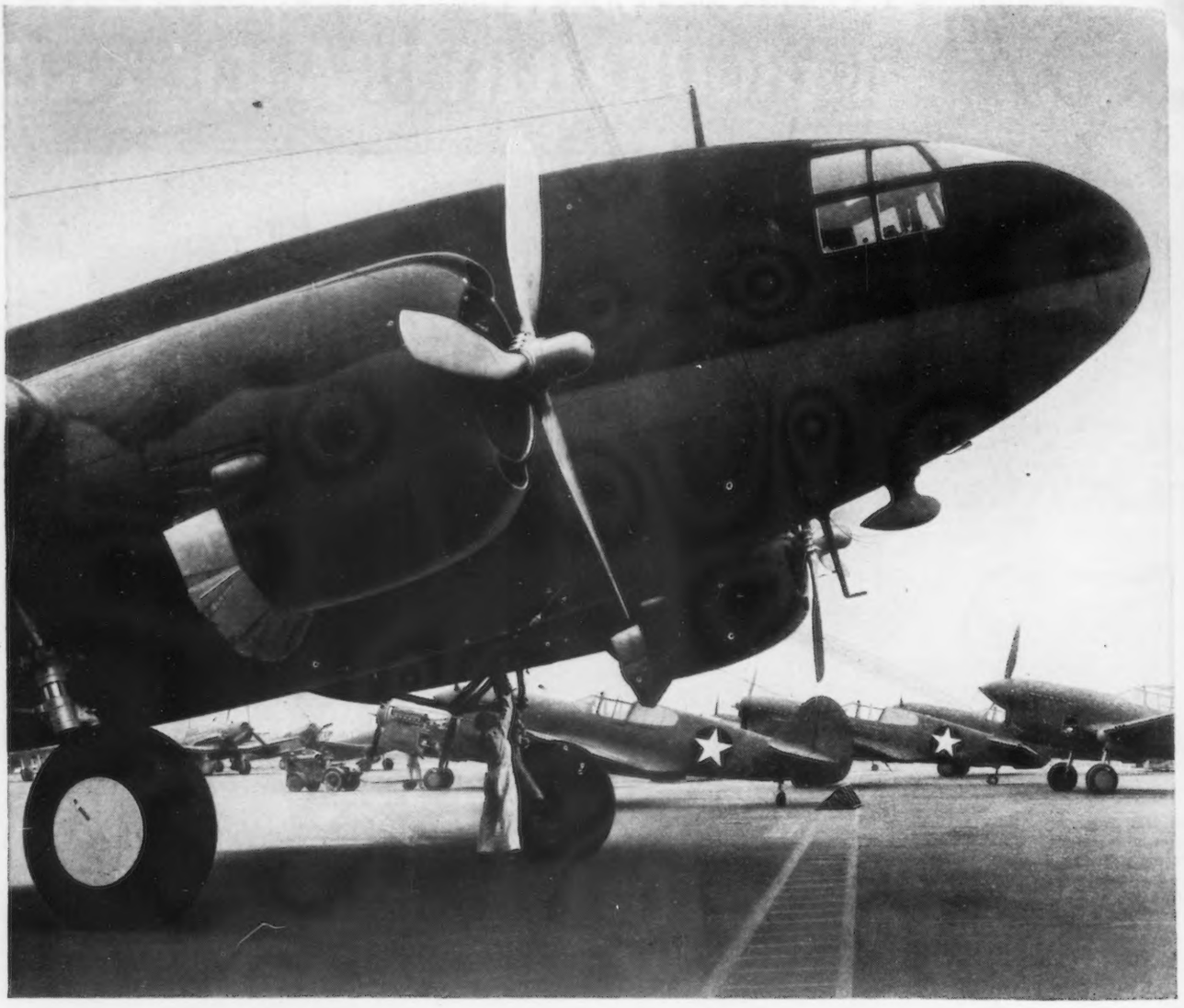


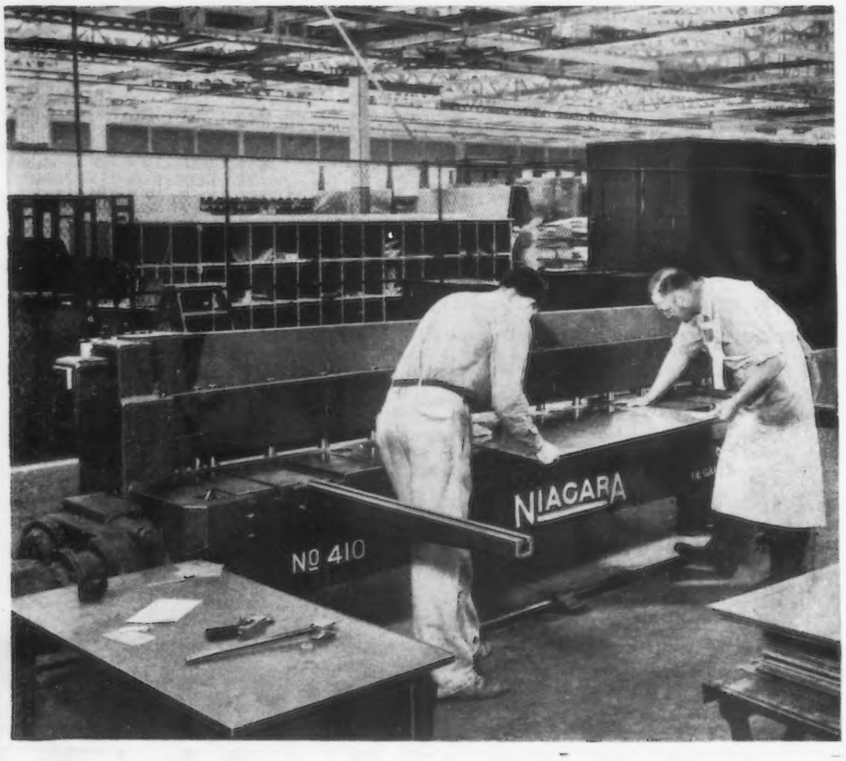
You may have a similar metal working problem to this—an outstanding example of how critical metal can be saved with proper hydraulic press equipment. Study the step by step development of the propeller hub forging as shown on the left. These forgings are handled on the 7200 ton forging and extrusion hydraulic press illustrated above. Consider your own production problems. Can a Farquhar Hydraulic Press lick these problems for you?

Farquhar builds hydraulic, self-contained, production presses for capacities from three tons and up for smokeless powder blocking, graining and finishing; shell nosing, piercing and drawing; cartridge case drawing gun straightening; forging, blanking and metal forming; and for many specialized applications. For complete details write Hydraulic Press Division A. B. Farquhar Company, Limited York, Penna.

FARQUHAR
HYDRAULIC PRESSES

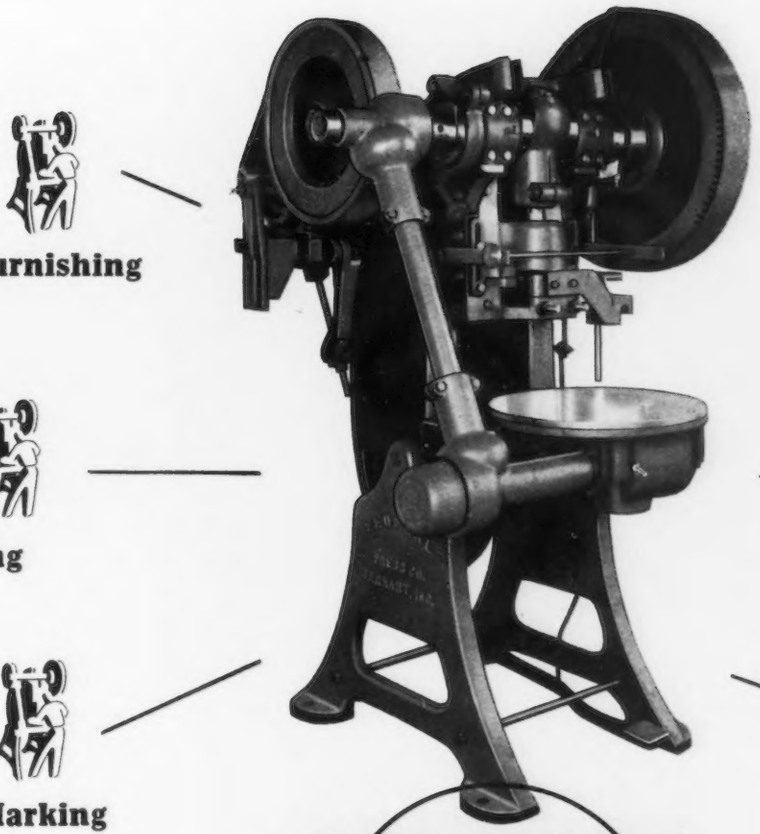
A. B. FARQUHAR CO., Limited, YORK, PA.





Production of America's largest transport planes and big bombers as well as fighters is being speeded up by batteries of Niagara Power Squaring Shears. Cutting accuracy heretofore unobtainable is made possible by the modern design of Niagara Shears. Quick setting gages self measuring to increments of 1/128 inch, flat cutting of narrow strips, drive mechanism enclosed in oiltight cases, instant acting sleeve clutch and full visibility of cutting line are just a few of the many Niagara features.

Niagara Power Squaring Shears are built up in a complete range of sizes up to 20 foot cutting lengths. Complete specifications available by writing Niagara Machine & Tool Works, Buffalo, N. Y. District Offices: General Motors Bldg., Detroit; Leader Bldg., Cleveland; 50 Church St., New York.



Burnishing

Staking

Forming

Assembly

Marking

Combinations

FEDERAL
DIAL FEED
PRESSES

V for *Variety* of jobs they can do

FEDERAL Dial Feed Presses are daily performing a wide variety of jobs which, until recently, were not thought of as press operations. Their versatility is limited only by the skill and resourcefulness of the production engineer. Originally employed for secondary operations, these precision presses are being used for primary and assembly work, and in some cases perform intricate combinations of all. Burnishing, forming, staking, and high speed marking are handled with ease.

FEDERAL Dial Feeds are speeding war production in hundreds of plants. They are fast, safe, smooth, precise. Easily indexed to any part of crankshaft revolution from 90 to 180 degrees, giving long or short dial dwell. 10 or 12 stations. Dial feed is available on eight different size presses. Write today for literature, or help in working out a specific problem.

THE FEDERAL PRESS CO.

510 Division Street, Elkhart, Indiana.

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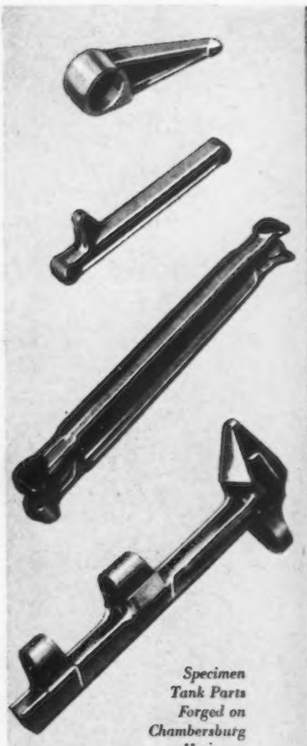
9 *FEDERAL SIZES* Federal Open-Back, Inclinable Presses are available in nine sizes, with capacities ranging from six to 80 tons—either flywheel or geared type. They are the products of 40 years' experience in press building.



Specimen Tank Parts Forged on Chambersburg Hammers

Airplane Engine Parts Forged on Chambersburg Hammers

FORGINGS COME FIRST

★

Forgings are vitally essential to the war effort because airplanes, tanks, ships and guns must be built to "withstand the unpredictable" . . . for which specification there is nothing to equal the strength and durability of the drop forging. ★ Before the cutting and grinding machine tools bring these parts to their final microscopic perfection, they are first forged to close limits, by tremendous impact between steel dies, in great drop hammers, such as those bearing the time-honored name of CHAMBERSBURG. Metal is saved, time is saved . . . and Victory brought closer . . . by the speed, power and accuracy of Chambersburg Hammers.

CHAMBERSBURG ENGINEERING CO., CHAMBERSBURG, PA.

THE CECOSTAMP

Airplane and other sheet metal parts of high strength alloys are formed quickly and without distortion on the Chambersburg CECOSTAMP.

The Cecostamp is an impact stamping machine of exceedingly flexible control, designed by Chambersburg Engineering Company specifically for the aviation industry.

CHAMBERSBURG

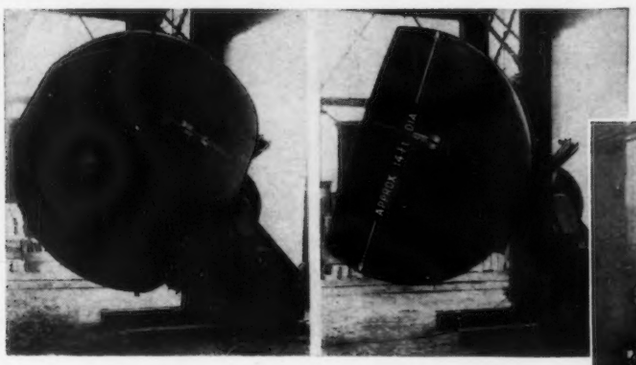
HAMMERS • CECOSTAMPS • PRESSES

Ransome Welding Positioners for Greater Production

Left. Many-angled piece positioned for all downhand welds.

Center. Heavy machine bases are of welded construction.

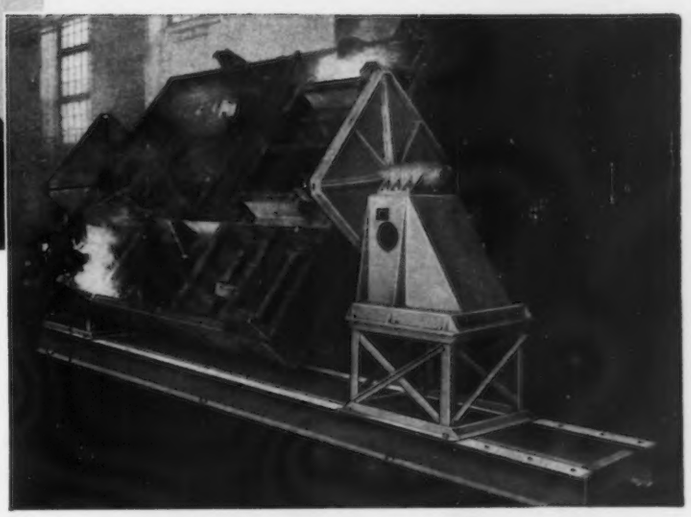
Right. A complicated weldment easily handled on a positioner.



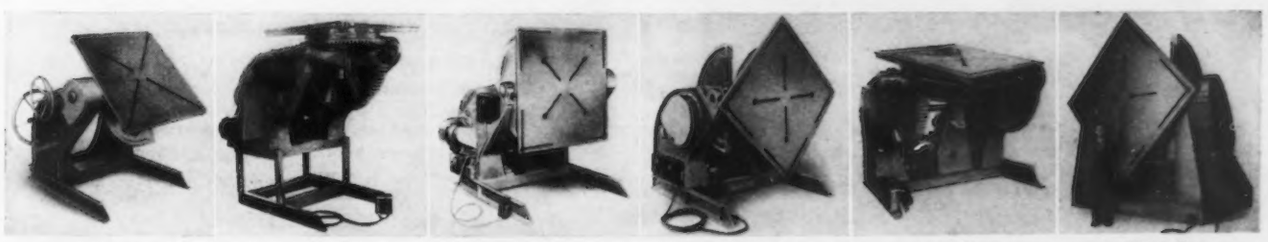
Standard positioner fitted with extension brackets for handling work larger than the table top, such as tanks, frames, etc.

•

Rotating Welding Fixtures consisting of motor-operated Headstock with Tail-stock unit, handling large frame. Tail-stock is placed to accommodate objects of various lengths.

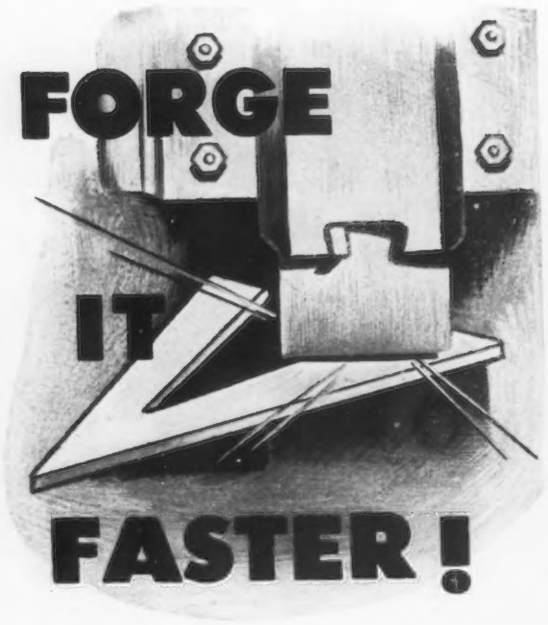


BOOTH B-102 • NATIONAL METAL SHOW • CLEVELAND • OCTOBER 12 THRU 16



Light-duty Hand-operated | 2500 lb. Cap. on Elevating Base | 3000 lb. Cap. | 3 Ton Cap. | 8 Ton Cap. | 20 Ton Cap.

INDUSTRIAL DIVISION **RANSOME MACHINERY CO.** DUNELLEN NEW JERSEY



★ *Speed* is THE need in total war. And, Nazel forging hammers have it!

Their rhythmic cadence—the powerful, squeezing blow—the ease and accuracy of control—assure more and better production per man hour. Good forgings with fewer reheats!

Today, that helps you "beat the promise" in production of material for the fighting fronts.

Tomorrow, these same Nazel advantages will help you meet the demands of peacetime competition.

LOBDELL-NAZEL

THE ONLY AIR-ACTUATED, SELF-CONTAINED FORGING HAMMER PERFORMANCE-TESTED BY OVER 1100 USERS IN MORE THAN 70 INDUSTRIES

LOBDELL COMPANY • Wilmington, Del.

IMPORTANT NOTE

FOR TOOL DESIGNERS AND ENGINEERS

Have you considered Strenes Metal for drawing and forming operations? Have you checked with the many war plants using this unusual material? Strenes Metal can be cast to shape, eliminating many machining hours . . . can be used where long runs are required . . . can be safely specified where negligible upkeep is important. Get facts and figures without delay.

The Advance Foundry Co., Dayton, Ohio

STRENES METAL

FOR DRAWING AND FORMING OPERATIONS

By Our Army and Navy in Foreign Service

In these days when we are doing everything humanly possible to rush supplies to our forces abroad, bottlenecks *must* be eliminated. That is why many manufacturers today are turning over those intricate pipe bending problems to SWAN.

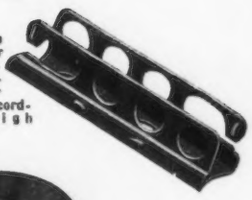
SWAN assures on-time deliveries—exact workmanship. The SWAN plant is especially equipped to handle both small and large volume orders in precision bending, coiling, expanding, flattening, brazing and welding of all shapes of pipes, tubes and tubular rings. Write today for full literature.

SWAN ENGINEERING COMPANY, Inc.
408 Frelinghuysen Ave., Newark, N. J.

The unique Dieing Machine produces intricate stampings to high precision at greatly increased rates

50-TON DIEING MACHINE
Other capacities: 10 tons to 300 tons

Machine gun belt link produced complete one per stroke to extreme precision limits at exceptionally high speed.



Cartridge clip for caliber .303 rifle produced complete one per stroke at record-breaking high production.

Airplane strut seat of .031" brass produced complete one per stroke at new high rate.

Another ... the numerous machine gun belt links produced from flat material complete per stroke to precision limits.

This shell, involving 8 operations, is produced complete one per stroke at high speed including 1⅜" draw.

Airplane fuselage hinge of duralumin produced complete per stroke in continuous strip to high precision including BROACHING.

Guns, bombs, planes—their operation relies on precision stampings made COMPLETE PER STROKE on Dieing Machines

In the greatly intensified program of ordnance and airplane manufacture, great reliance is placed upon the Henry & Wright Dieing Machine because of its unique advantages, especially its ability to produce intricate stampings at greatly increased rates to extreme precision. In the production of machine gun belt links, cartridge clips, mechanical time fuze parts, bomb components, airplane engine and instrument parts, and scores of other items whose precision affects the successful operation of fighting equipment—in all such stampings you find the Dieing Machine giving an unequaled combination of High Precision and High Production. Precision of product can consistently be held within .0002" limits when required. Production of one Dieing Machine equals that of 5 to 10 conventional presses and operators, producing 1 to 20 completed stampings per stroke at speeds up to 600 s.p.m. In addition, the Dieing Machine offers the advantage of conserving vital tools: die life is customarily increased 600% to 1200% because of the remarkable operating precision of this unique automatic press.

MUNITIONS STAMPING COUNSEL

During nearly four years, Dieing Machines have been turning out an endless variety of stampings required by the war program. We believe we have the most complete fund of experience in this field, and gladly place the counsel of our engineers at your disposal.

TYPICAL MUNITIONS ITEMS AND ASSEMBLY OPERATIONS COMPLETE PER STROKE

STAMPINGS

- Machine gun belt links
- Mechanical time and contact fuze parts
- Rifle components
- Cartridge clips, or rifle chargers
- Gas mask stampings
- Ammunition stampings
- Bomb components
- Shell parts
- Detonator stampings
- Airplane instrument, engine and fuselage parts

OPERATIONS

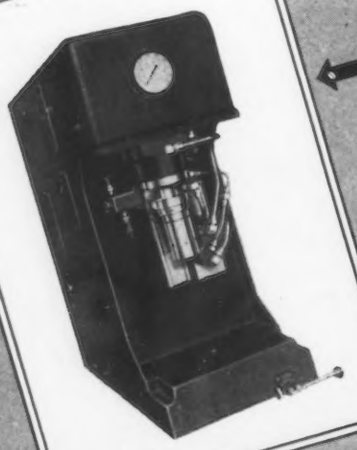
- Bullet assembling
- Primer inserting
- Automatic time and contact fuze assemblies

Request Catalog #42

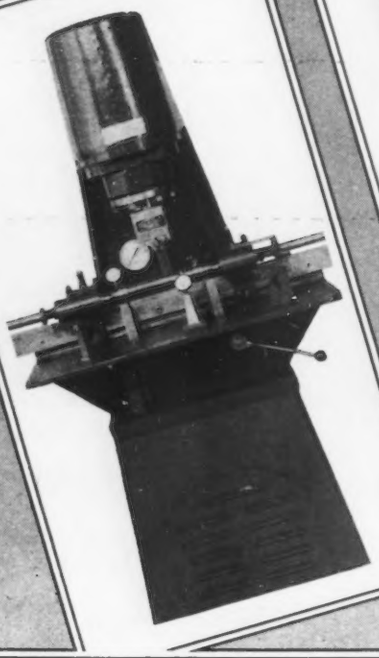
THE HENRY & WRIGHT MFG. CO.
457 WINDSOR ST. HARTFORD, CONN.

HENRY & WRIGHT DIEING MACHINES

Press No. 124 HYDRAULIC STRAIGHTENING PRESS. 10-15-25-50 ton Capacities. Pump and Motor enclosed. Manually and foot operated.



No. 109 BENCH TYPE PRESS. MANUAL OPERATED PILOT CONTROL VALVE CIRCUIT. Automatic stop limit adjusted for selective stroke and and travel. Single control or dual control valve. Net weight approximately 1450 lbs.



HYDRAULIC PRESSES

Send for Complete Information

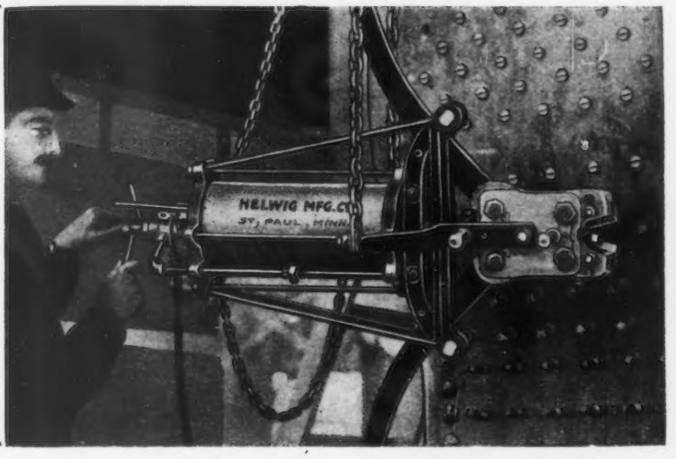
DORR-PATTERSON CO., INC.
3362 Wight St., Detroit, Mich.

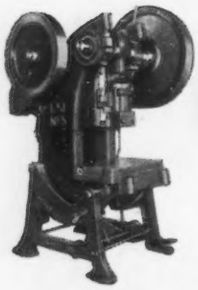
HELWIG PATENT PNEUMATIC BOLT, WIRE, ROD AND BAR CUTTER

Cuts Bolts 1⅝" to 0, face square proper length just right for riveting, averaging 800 an hr.

STEEL and WIRE MILLS are finding new applications for this little tool. Operates from the side allowing it to cut any length material desired. Easily handled, hanging from an overhead tackle and can be moved rapidly from place to place doing its work as fast as a man can handle it. The small cutting knives are made of high grade tool steel and can be easily replaced when worn. Hand Bolt Clippers. Safety Electric Wire Cutters. Seam Buttoners. Squeezer Tongs. Strap Cutters. Monkey Wrenches.

HELWIG MFG. CO., ST. Paul, Minn.





L&J Inclinable
POWER PUNCH PRESSES

No. 5 Back Geared Type

*Capacity, 49 Tons — Speed, 45 Strokes per minute—*Standard Die Space, 10¼"—(Bed to slide, stroke down adj. up)—Stroke 4"—Weight, 6700 lbs.—Precision built.*

Write for literature.

*No. 5 SPECIAL has 15¼" Die Space

STANDARD SINCE 1911

L & J PRESS CORP. Elkhart, Ind.
1623 STERLING AVE.
SUCCESSORS TO LOSHBOUGH-JORDAN TOOL & MACHINE CO.

WIRE STRAIGHTENING AND CUTTING MACHINERY

HIGH SPEED Machines for round wire, flat wire, welding wire, all kinds of wire

The F. B. SHUSTER COMPANY
NEW HAVEN, CONNECTICUT

Straightener Specialists Since 1866

Cleveland Single Point Presses

These two Cleveland Single Point Presses, which are designed with single connections located in the center of the slides, are typical of this Modern line which also embraces Two Point Presses having two connections and Four Point Presses having four connections, and each of the three types can be furnished in sizes and capacities to suit particular requirements.

The design of these Modern Cleveland Presses not only contributes to greater rigidity and ruggedness but to extreme accuracy in the production of duplicate parts and a considerable saving in overall floor space.

The 1-28-200 has a capacity of 200 tons while the 1-36-250 has a capacity of 250 tons.

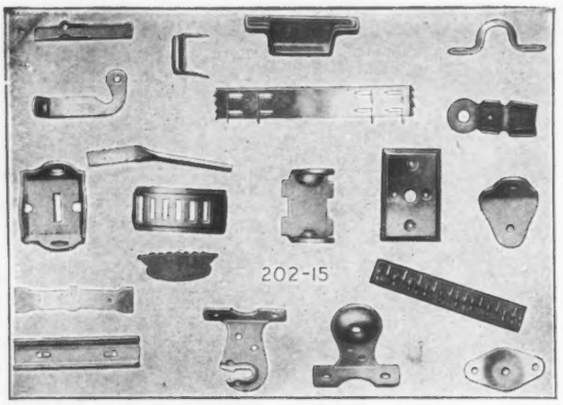
Modern Presses THE CLEVELAND PUNCH & SHEAR WORKS COMPANY, *Cleveland, O.*

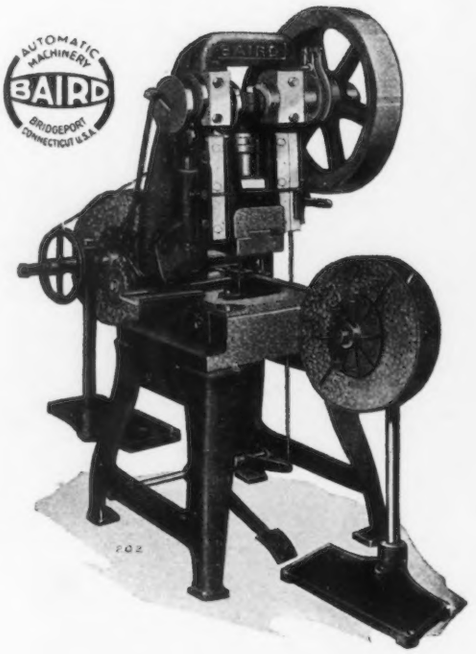
BAIRD AUTOMATIC PRESSES . . .

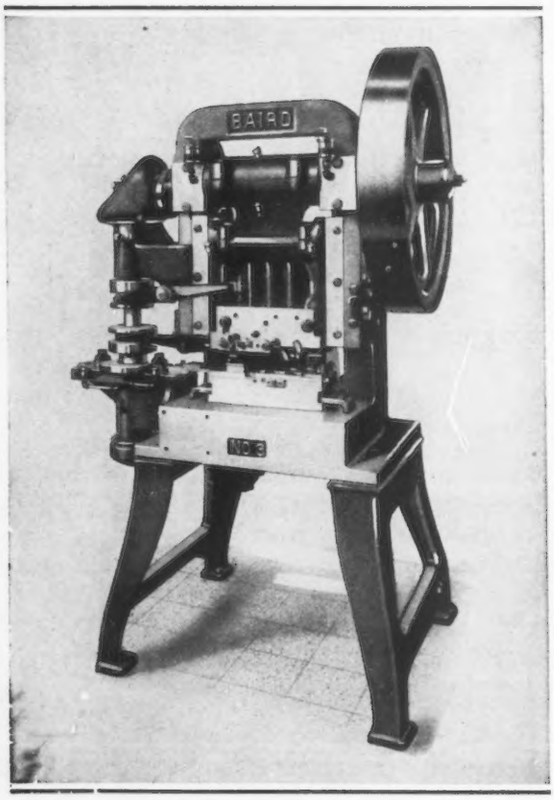
Herewith are shown two types of Baird Automatic Presses for large quantity production. The one to the right is a Standard Heavy Single Action Open Back Press with readily removable and readily attachable automatic attachments, in this instance a single station transfer.

Many manufacturers using automatic machines elsewhere in the shop are overlooking the benefits of the automatic principle in their press departments. For constructive suggestions leading toward betterment of press production we invite such manufacturers to

"Ask BAIRD About It"







AUTOMATIC MULTIPLE TRANSFER PRESSES

The latest of the many Baird achievements is the Automatic Multiple Transfer Press for the automatic production of articles from the coiled material.

Transfer fingers not only transfer the blank to various stations, but they also retain their grip until the punches make contact.

Machines have been arranged with different types of feeding mechanism, strokes for slide, stroke for transfer to best suit the article to be made.

All punches have independent adjustments. The punches, dies, transfer slide and fingers constitute a unit which may be removed from the press *in a very few minutes.* This important feature eliminates time-consuming tool set-ups when changing over from one job to the next.

Over 60 years of Baird engineering skill and experience are embodied in this new Automatic Multiple Transfer Press which is built in six sizes to take strips 1½" to 6" in width. Get the full details of this new development.

"Ask BAIRD About It"

THE BAIRD MACHINE COMPANY
BRIDGEPORT, CONN.

ACCESSORY EQUIPMENT AND PARTS

HERE'S THE MODERN WAY

Greater Production and Lower Costs

DO you want greater production without expanding your plant? Do you want lower costs? Are you interested in promoting safety? Then you should investigate Cleveland Tramrail.

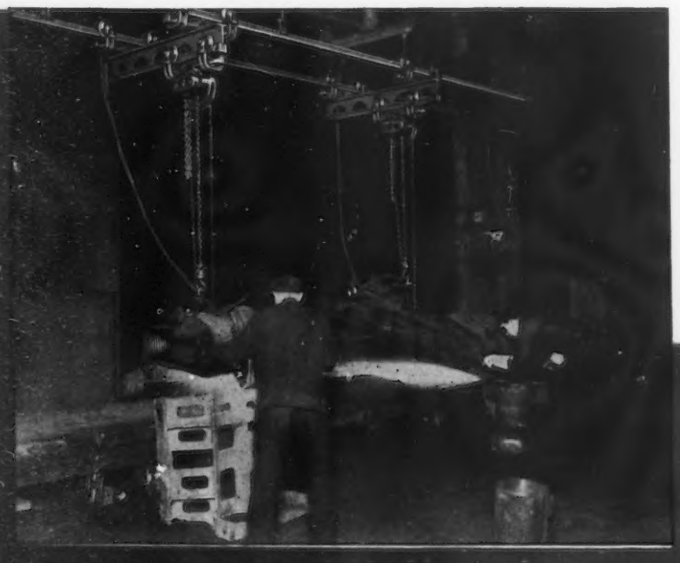
Because the most important item affecting costs and output is materials handling, Cleveland Tramrail overhead materials handling equipment has become an outstanding factor in aiding defense production.

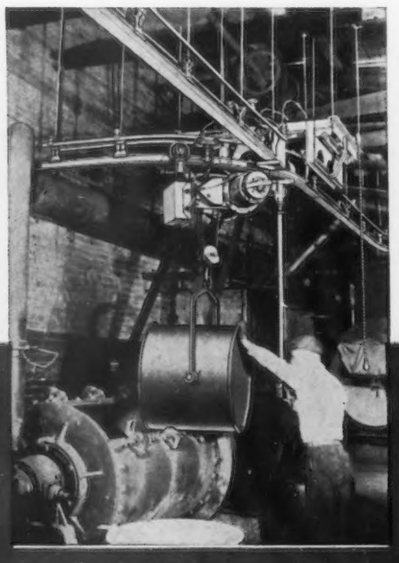
This equipment has been developed for nearly every requirement in the metal working industry and is now serving thousands of machine and structural shops, steel warehouses, foundries, etc.— large and small — in every department.

Whether you need only a simple hand-operated crane or an extensive electrified system, Cleveland Tramrail can help you.

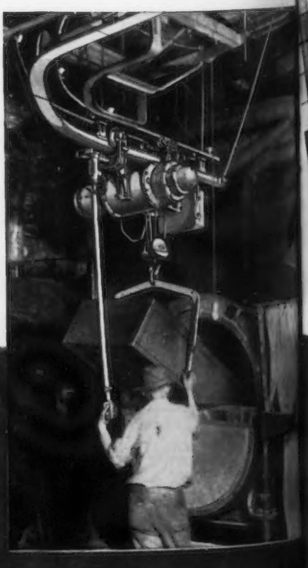
If you have a materials handling problem, you will get real help from the new Cleveland Tramrail Pocket Edition Catalog and Engineering Manual. This 420-page book is replete with hundreds of illustrations, drawings, and charts — a veritable encyclopedia on overhead materials handling. Sent free on request written on your company letterhead.

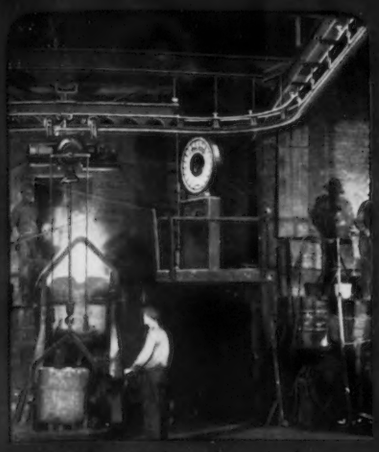
CLEVELAND TRAMRAIL DIVISION
THE CLEVELAND CRANE & ENGINEERING CO
1115 E. 283rd Street Wickliffe, Ohio





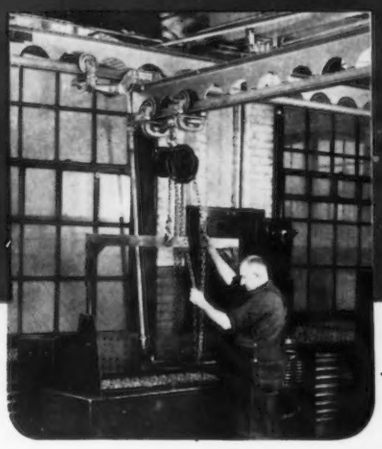
A rigid arm push-button controlled hand-propelled carrier with electric hoist, serving tumbler barrels, enables one man to handle loads.





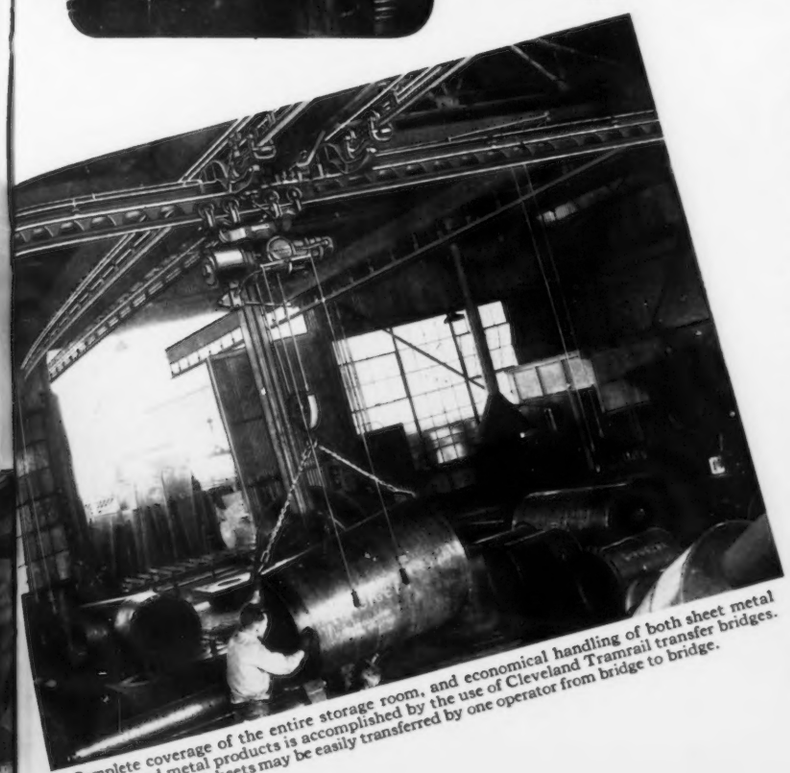
Metal from cupola can be conveniently weighed by any overhead crane scale built into a Cleveland Tramrail system.

Single-leg gantry cranes are saving many hours of production time in dozens of busy plants. They work under busy overhead cranes and take care of light local handling. With the help of several gantry cranes, one overhead crane is usually sufficient for a shop bay.

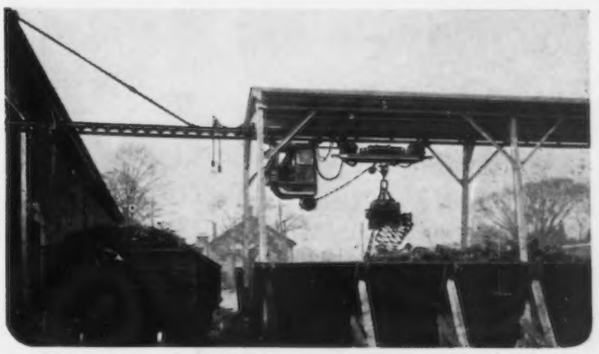


Large racks of machined parts can be quickly given a protective coating by dipping in a special oil. The Cleveland Tramrail overhead crane and chain hoist makes this an easy task.

Many shops find that extensive use of Cleveland Tramrail cranes for picking up and fitting parts saves much valuable time and greatly steps up production. Furthermore, safety is promoted and workers' fatigue minimized. An installation like this is surprisingly low in cost.



Complete coverage of the entire storage room, and economical handling of both sheet metal and finished metal products is accomplished by the use of Cleveland Tramrail transfer bridges. Loads of sheets may be easily transferred by one operator from bridge to bridge.



Moving of scrap from the shop floor to storage bins and cars is accomplished inexpensively with a Cleveland Tramrail cab-controlled carrier and magnet. Note the jib crane over the rail siding which can be swung out of way for train movement.

CLEVELAND TRAMRAIL

The better the *Spring*, the better the harvest!

The axiom—"*As ye sow, so shall ye reap*" bore greater significance to the old fellow's hand-casting of grain than with the modern day mechanized method—'tho an ideal Spring growing season is still a vital factor toward reaping the bumper crop . . . . *Better* springs are therefore necessary for *better* harvests . . . . The mechanical spring which enters into the design of *your* product, unlike a non-active component in the product, is a powered mechanism in itself. Small and insignificant as it might appear, the spring's importance (per corresponding area or weight) exceeds by many times, that of any other part . . . . How essential then—the source from which you choose your spring products. LEE-BUILT springs of SCIENTECH design, *sown* at the start, invariably yield harvests of greater satisfaction!

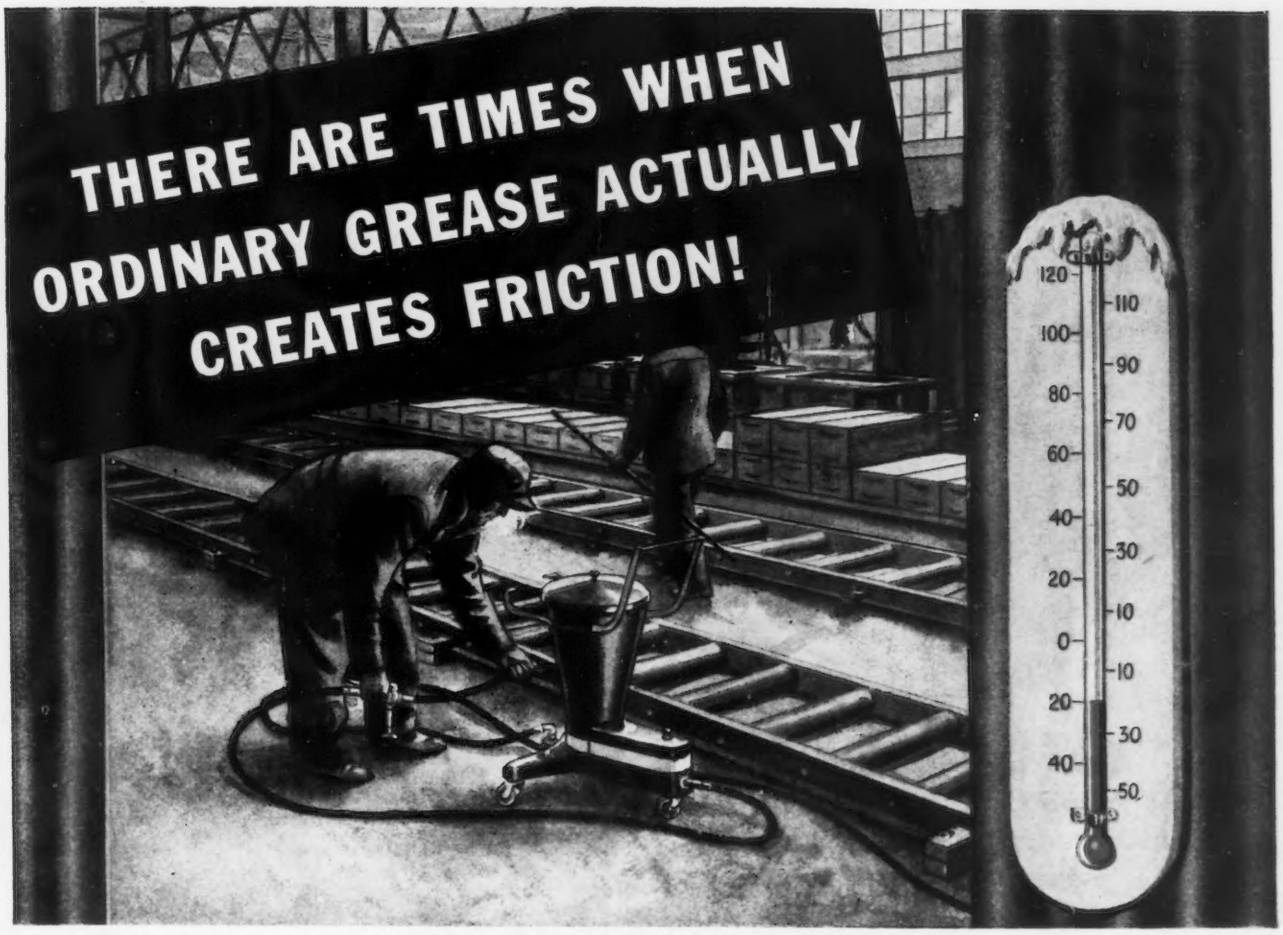
Illustration—Courtesy, International Harvester

SCIENTECH
Spring Service

LEE SPRING COMPANY
INCORPORATED

30 MAIN STREET BROOKLYN, N. Y.

LEE-BUILT TRADE MARK SPRINGS



Alemite "Sub-Zero" Keeps Bearings Safe At Temperatures Down to 40° Below!

THIS winter more machines than ever before must operate at full speed outdoors or in unheated buildings. Ordinary grease can cease to be a lubricant at extreme cold temperatures. In fact, it *actually creates friction.* But bearings can be safeguarded by using Alemite Sub-Zero Lubricant, a semi-fluid designed especially for such use. It meets government specifications types "D" and "F" applying to Class-14 of General Schedule of Supplies, U. S. Treasury Department, also U.S. Army specifications.

This is only one of many Alemite Specialized Lubricants which meet extraordinary conditions. There are those which withstand extreme heat, others which work under water. All are proved by years of successful service to industry. They can help you prolong machine life and maintain uninterrupted production at a time when delays must be avoided.

SEND FOR YOUR COPY!

The Alemite Industrial Lubrication Manual contains specific recommendations for meeting literally hundreds of industrial lubrication problems. Write for your FREE copy today!

Another Product of STEWART WARNER

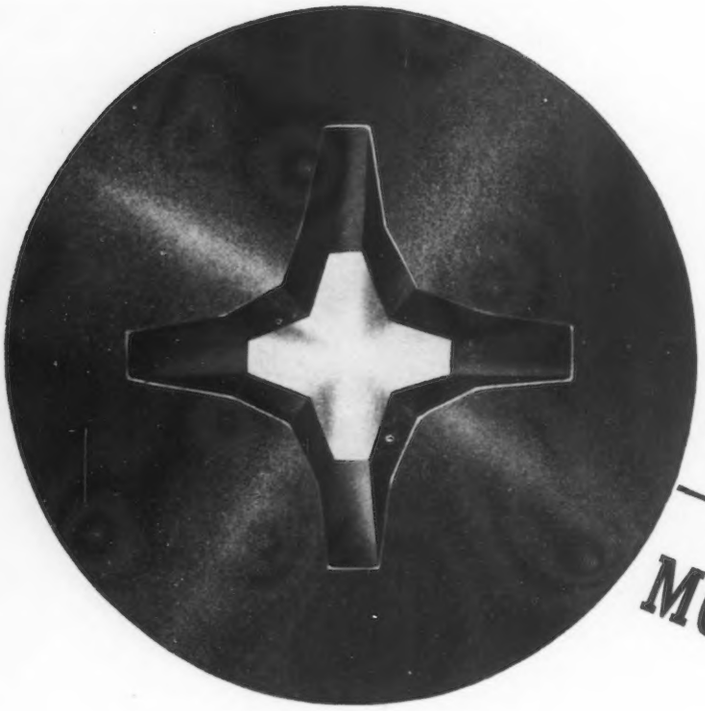
ALEMITE

REG. U.S. PAT. OFF.

Industrial LUBRICATION

1853 DIVERSEY PARKWAY, CHICAGO, ILLINOIS • BELLEVILLE, ONTARIO

Ask Anyone in Industry!



MULTIPLYING A MONEY-SAVING PLUS

America's leading firms write "American Plus" in front of "Phillips" on their orders . . . to get "3 Plusses" with every recessed head screw

American's Engineering. The engineers who first helped to develop the patented Phillips Recess have naturally led the way in helping screw-using industries save millions of dollars . . . by applying this great advance in screw design to countless assembly lines. American Screw Company engineers are available to help *you* affect similar time-and-motion savings . . . savings which cut unit-assembly costs an average of 50%.

American's Quality Control. Both raw materials and methods of manufacture pass under constant scrutiny in American Screw Company's chemical and metallurgical laboratories. Testing machines . . . for metal structure, torque, vibration, shear, etc. . . . insure the complete reliability of every shipment of American PLUS Phillips Screws.

American's Inspection Methods. There are few, if any, parallels in the screw industry for American Screw Company's unique system of piece inspection which watches every single screw for defects . . . and permits no single package to leave the plant without its full complement of screws.

Multiplying distributors to meet multiplied demand. The "3 Plusses" are 3 good reasons why America's leading manufacturers have multiplied their demand for American PLUS Phillips Screws . . . and also why more and more mill supply distributors are prepared to meet their increased demands — and *yours* — right now!

By **3**

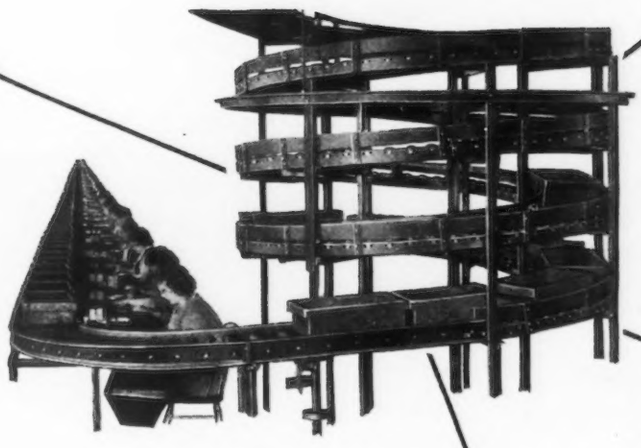
AMERICAN SCREW COMPANY
Providence, R. I.

Chicago, Ill.
589 E. Illinois St.

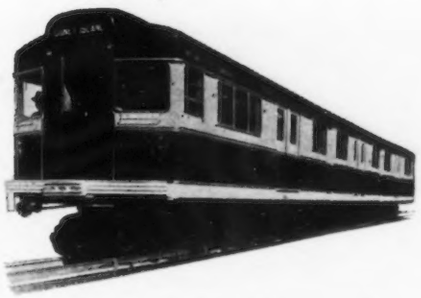
Detroit, Mich.
4-258 General Motors Bldg.

AMERICAN PRODUCED THE PLUS . . .
THE PLUS IS PRODUCING FOR AMERICA

You'll find American PLUS Phillips Screws in the cab construction of **Brockway Trucks.**



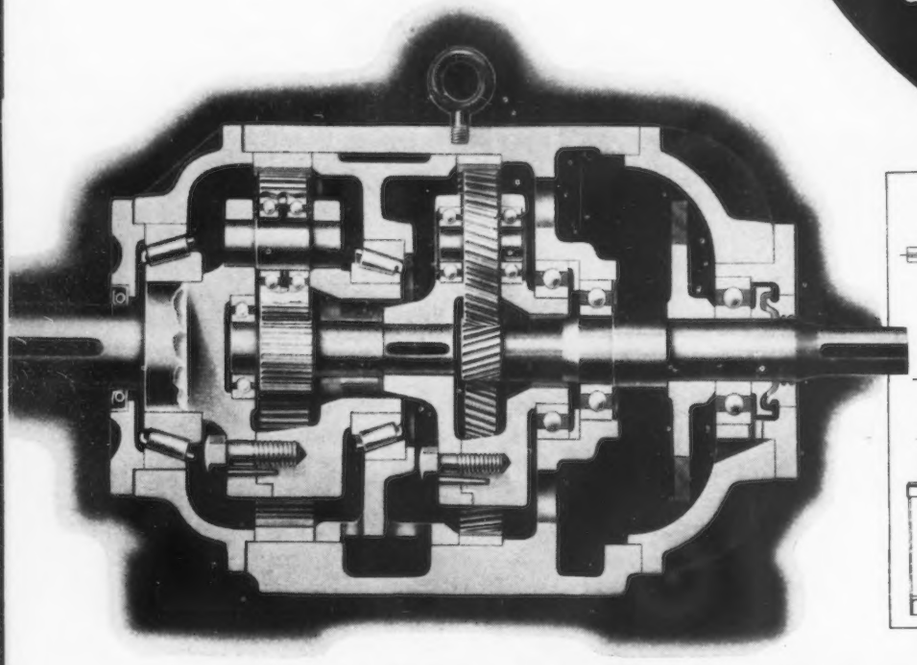
Special friction spring screws used in **Guiberson Tubing Catcher** eliminated "shearing off" trouble experienced with other screws.

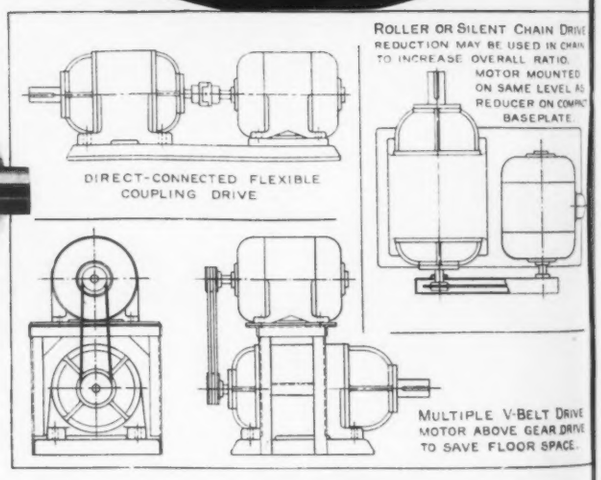


American PLUS Phillips Screws on the Coney Island Express — equipped by **Clark Equipment Company.**

. . and where the machine installation suggests a straight line drive . . . you want a Philadelphia Planetary Speed Reducer . . .

The Philadelphia Planetary Speed Reducer was designed to provide a straight line drive superior to the old spur gear type. In these units have been included many of the construction features, parts and precision manufacture that have made the Philadelphia MotoReduceR (the built-in drive) so widely preferred. These Planetary Units will give equal top-notch performance in those applications where a separate drive is desirable. They are compact yet rugged with a well balanced design. The accompanying sketches suggest several ways of mounting. Single, compound and double reduction types fit a wide range of requirements. For details send for catalog 100.



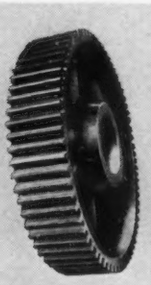

ROLLER OR SILENT CHAIN DRIVE
REDUCTION MAY BE USED IN CHAIN TO INCREASE OVERALL RATIO.
MOTOR MOUNTED ON SAME LEVEL AS REDUCER ON COMMON BASEPLATE.
DIRECT-CONNECTED FLEXIBLE COUPLING DRIVE
MULTIPLE V-BELT DRIVE
MOTOR ABOVE GEAR DRIVE TO SAVE FLOOR SPACE.

PHILADELPHIA GEAR WORKS

INDUSTRIAL GEARS
AND SPEED REDUCERS
LIMITORQUE VALVE CONTROLS

ERIE AVENUE & G STREET
PHILADELPHIA, PA.
New York, Pittsburgh, Chicago

Philadelphia
LIMITORQUE CONTROL
operates all types of valves, etc., safely, economically, from convenient stations.



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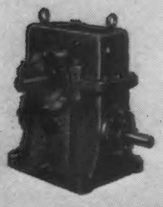
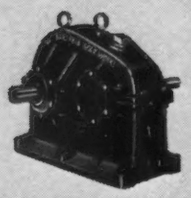
GEARS
All types and sizes of industrial gears. Can be supplied in all materials.



Philadelphia
WORM GEAR SPEED REDUCER
right angle drives — vertical or horizontal. Wide range of ratios and horsepowers.

Philadelphia
MOTOREDUCER
The economical self-contained drive, Horizontal or Vertical types — various ratios and horsepowers.

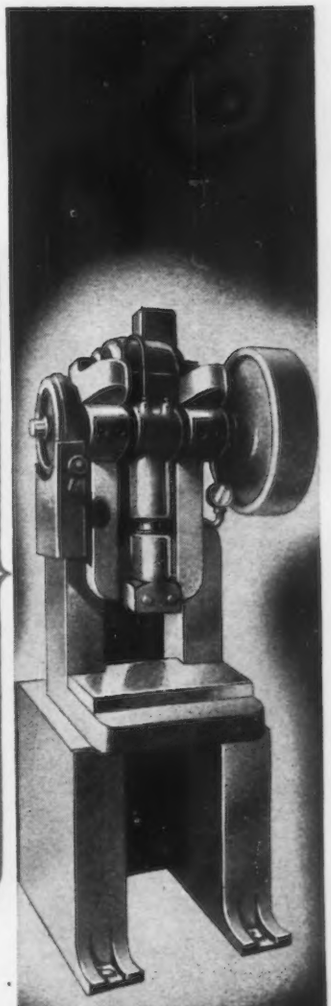


Philadelphia
HERRINGBONE SPEED REDUCER
for heavy loads at high speed. Single, Double, Triple Reductions, various ratios and horsepowers.

In this vital gap . . .

between prime mover and the machine to be operated

PLANNED POWER TRANSMISSION



helps win the battle of production, because it saves power—improves power factor—lowers connected load—reduces maintenance—cuts unit cost—increases production

PLANNED POWER TRANSMISSION is the proper selection, use and maintenance of power transmission machinery.

This book, yours for the asking, explains PLANNED POWER TRANSMISSION. Not a catalogue, not a selling piece. But a contribution by our industry to the winning of America's great battle of production.

SEND FOR IT TODAY

POWER TRANSMISSION COUNCIL INC.

53-63 PARK ROW NEW YORK, N.Y.

The Power Transmission Council, Inc.—a service organization—represents impartially the manufacturers and distributors of power transmission machinery. In the interest of all-out production it promotes PLANNED POWER TRANSMISSION.

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POWER TRANSMISSION COUNCIL, INC.
53-63 Park Row, New York, N. Y.

Sirs: Please send copy of "Modern Mechanical Power Transmission for Industry", containing suggestions for efficient application, use and maintenance of mechanical power transmission machinery.

*Name*_____

*Firm*_____

*Street*_____

*City*_____ *State*_____

This ad inserted for the Power Transmission Council, Inc., by a manufacturer of mechanical power transmission machinery, in the interests of American industry and the war effort.

Convoy Full Power
Straight Through to the Job

with WHITNEY CHAIN DRIVES

Power keeps moving steadily to the production front . . . in *full force, at constant speeds* . . . under the armored escort of Whitney Roller and Silent Chains. For every Whitney Chain provides the plus protection of extra tough, alloy-armored steels . . . added strength and stamina to stand the added war-time burdens of shock and overload, for the duration. No under-production, idle machine hours, or sub-standard quality can be charged to power drives . . . when the drives are Whitney Chains. So make Whitney *your* drive for full power, to win your battle for production.

★

PROTECT CHAIN LIFE *Keep sprockets properly aligned . . . chains properly lubricated . . . and you will get maximum drive life. And be sure to inspect your drives regularly . . . keep 'em rolling.*

★

The Whitney Chain & Manufacturing Company, Hartford, Connecticut

"NATIONAL" QUALITY NOTE
WOOD SCREWS—Clean-cut threads, with well-defined heads and slots.
SHEET METAL SCREWS—Well-formed threads of proper hardness to insure secure fastening of metal.

EDUCATION for the FUTURE

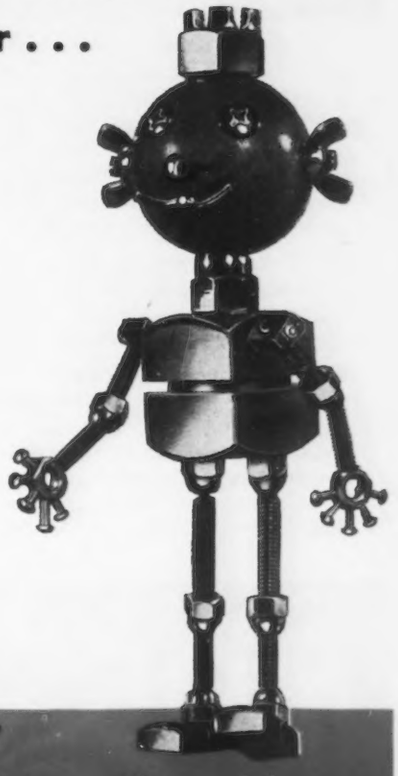
Lessons learned now = better "National" products for you later . . .

The war effort *comes first!* It comes first with you—comes first with "National".

And while our entire production capacity must now be devoted to the Army, the Navy and the country's leading war industries—today's wartime work at our plants is also an *education for the future!*

"National" quality standards, plus the experience gained in meeting rigid Air Corps requirements, will mean *tougher and better* screws, nuts, bolts and rivets for you later.

However, for the present, we will continue to help *Do the Nation's Biggest Job*—the best way we know how.

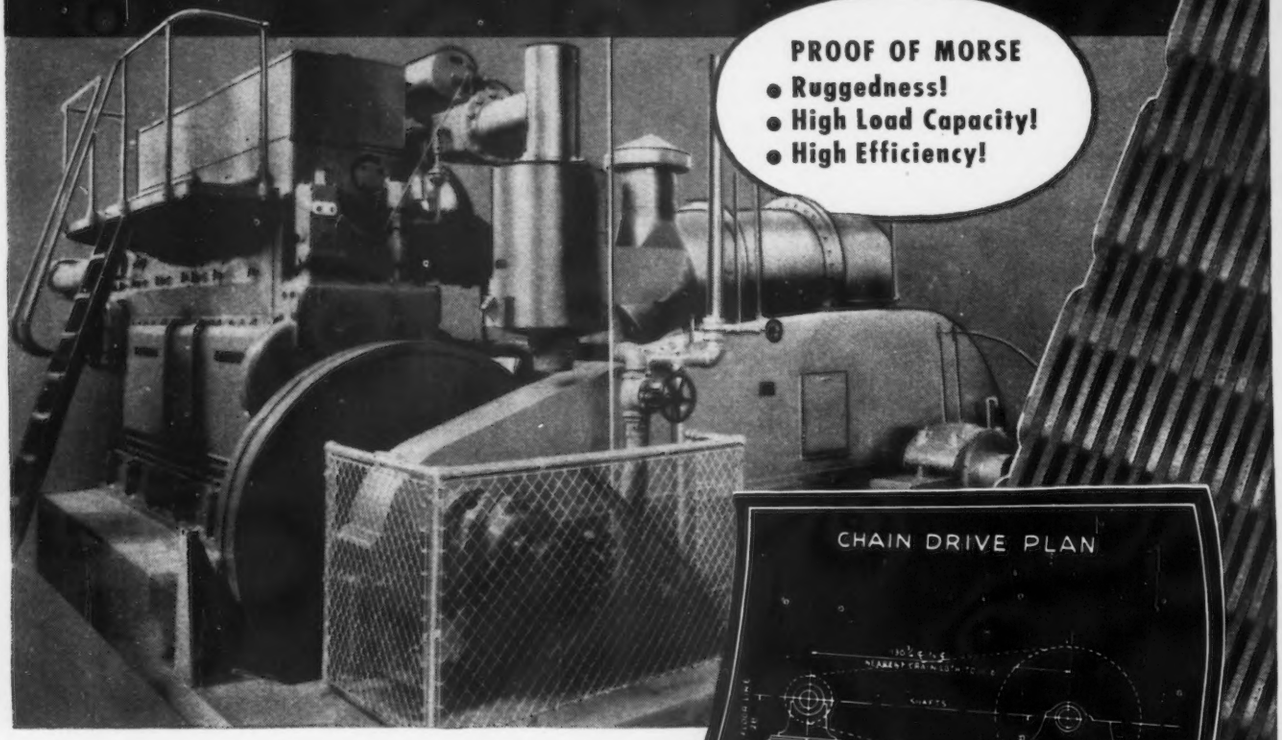


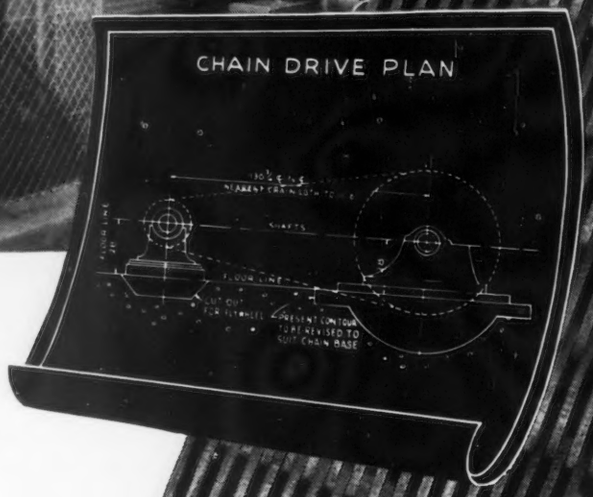
National
HEADED AND THREADED PRODUCTS

THE NATIONAL SCREW & MFG. COMPANY
CLEVELAND, OHIO

TEXAS too, keeps the Pressure Up

500 H.P. Water Pump driven with MORSE SILENT CHAIN DRIVE...





IN WESLACO, TEXAS, power for maintaining water irrigation supply throughout two counties is efficiently transmitted from a 540 H.P. gas engine operating at 360 RPM to a low head pump at 120 RPM by means of a Morse silent chain drive. The long history of such installations shows the ruggedness, dependability, and smooth quiet action of Morse drives.

Extremely compact, Morse Chain Drives are low in first cost, require practically no maintenance, and operate at 99.4% efficiency.

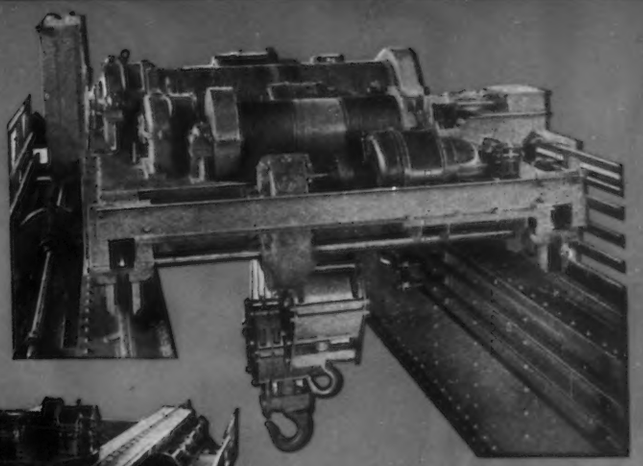
Whether your drive requirements be conventional or unusual, there is a Morse Silent or Roller Chain Drive in single and multiple widths to fulfill your exact demands. Sizes from fractional to 5000 horsepower. Morse Representatives everywhere are ready to help increase your productive output—engineer chain drives to the job.

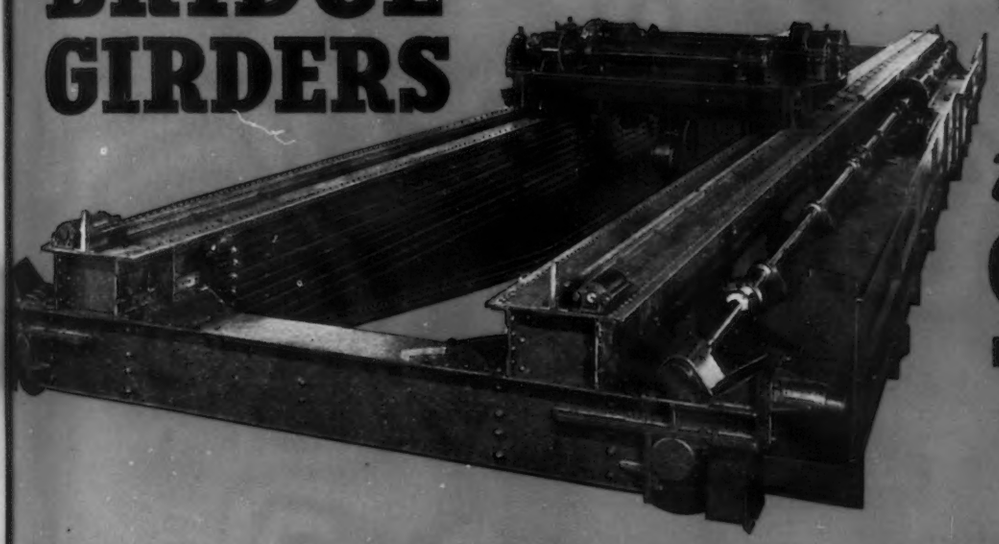
SILENT CHAINS · ROLLER CHAINS · FLEXIBLE COUPLINGS · CLUTCHES

MORSE *positive* DRIVES

MORSE CHAIN COMPANY ITHACA N. Y. DIVISION BORG-WARNER CORP

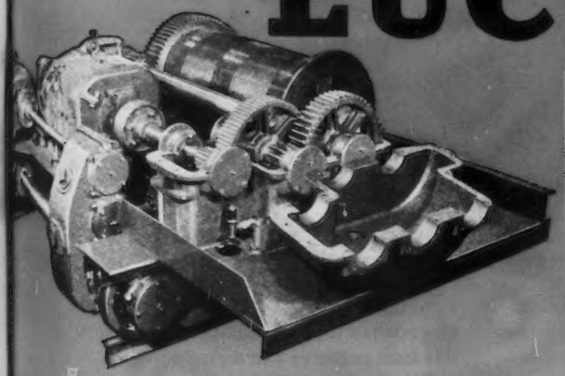
Notably Rugged
FROM BRIDGE GIRDERS



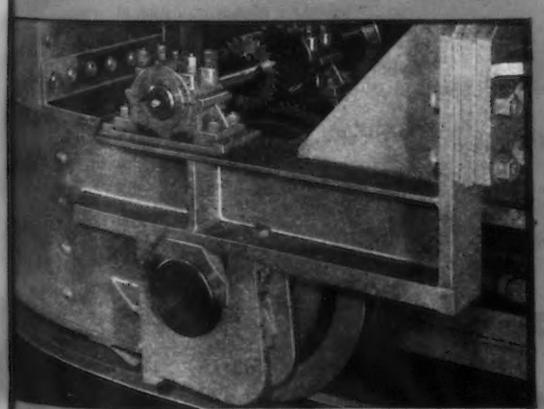


to GEAR TEETH-

EUCLID CRANES



A standard EUCLID 3-reduction trolley. Note the short heavy shafts and bearings on each side of the rugged gears and pinions. Axle shafts are of the double MCB type.



Euclid heavy duty end truck with steel members arc welded to form a box section of great strength and rigidity. Spline mounting of the driving pinion on the shaft prevents injury to the Herringbone gear due to side thrust.

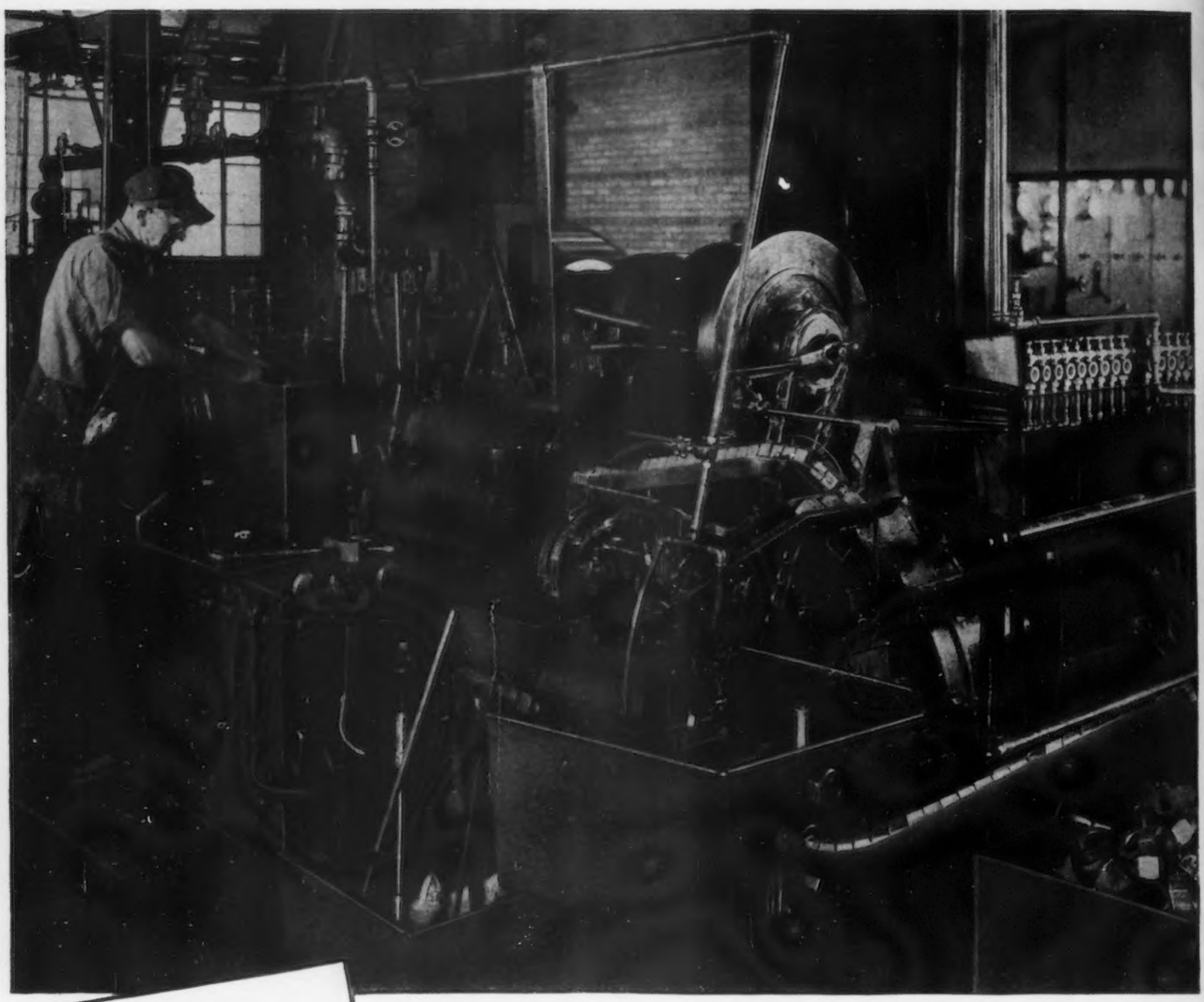
SINCE a crane is a burden carrier which is often overloaded and severely abused, it must be designed in every detail to withstand hard service for years to come.

With clear realization of this fact, gained through years of experience, Euclid Cranes are designed to withstand the hardest service with a minimum of repairs and adjustments.

Depths of girders; sizes and types of bearings; shafts, gear teeth and pinions; the capacities of motors, controllers and brakes; the ratio of drum diameters to cable size and numerous other details, are accurately determined to assure adequate strength with a liberal factor of safety.

THE EUCLID CRANE & HOIST COMPANY

1361 Chardon Road, Euclid, O.
(Suburb of Cleveland)



One of this machine's last operations is to "burnish" nuts (which have already been punched). This process—originated and perfected by R B & W engineers—compresses and actually burnishes the skin surface of the metal for improved appearance and maximum resistance to wrench abuse.

Tougher skin for holding the reins on iron cavalry

"FOR WANT OF A NAIL . . ." You remember the lines about the battle, and the Kingdom, lost because the horse became unshod.

In modern warfare, *one* broken bolt, *one* loosened nut won't lose the fight . . . but multiply such mishaps by the carload and listen to the Axis laugh!

You see why the automotive firms now making tanks, the farm equipment manufacturers now making mobile guns . . . insist on shock-resisting, tight-gripping R B & W bolts and nuts.

Flawless metal to start off with . . . cold-headed or cold-punched on R B & W-designed machines that maintain the flow of the metal's grain . . . threaded or tapped and finished by methods that preserve the metal's toughness.

The workers in our three great plants . . . one of them undoubtedly the world's largest, most modern plant for making cold-punched nuts alone . . . are straining every muscle and machine to keep well ahead of the factories that make such products for Hitler and Hirohito.

Russell, Burdsall & Ward Bolt and Nut Company. Factories at Port Chester, N. Y., Rock Falls, Ill., Coraopolis, Pa.; sales offices at Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, Portland, Seattle.

RB&W **RUSSELL, BURDSALL & WARD**

Making strong the things that make America strong

EMPIRE BOLTS NUTS-RIVETS

AND ALLIED FASTENING PRODUCTS...SINCE 1845

... That ships can move Materiel-Munitions-Men

I AM PROUD TO FIGHT...

I began life as a 33,000 lb. white-hot billet of fine steel.

Forging Hammers and Presses, Heat-treating Furnaces, Machines and Men trained me down to fighting weight . . . around 10,000 lbs. ringside.

I drive Liberty Ships, Submarines, P-T Boats, the Diesels of War.

I am proud to fight for the United Nations . . .

I was wrought, forged, seasoned and machined by expert designers, engineers and craftsmen at Erie Forge Company.

My counterparts..Shafting, Connecting Rods, Crankshafts, Steel Forgings and Castings..aregoodtoughfighters for the battle of the Nations and for Industry.

"Throw Your Scrap Into the Fight"

ERIE FORGE COMPANY, ERIE, PA.

★ ★ ★ ★ ★ ★ ★ ★ ★

Exide
IRONCLAD BATTERIES

THE more we save, the more we'll have. That's most important today. Wasteful buying, and wasteful misuse of equipment, are *out* for good.

Remember this, when caring for your dependable, long-lived Exide Batteries. Follow the simple rules printed on this page, follow them faithfully . . . and you're really working for America. Take care of your equipment, and help a lot of fighting Yanks take care of the Axis.

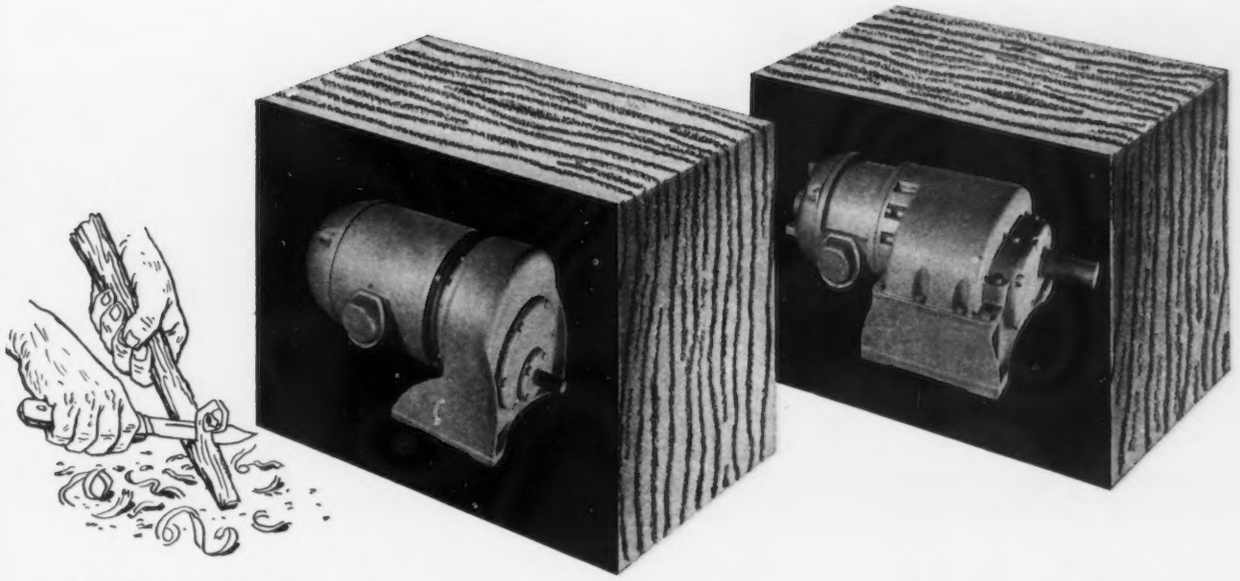
YOUR SCRAP will help WIN

AND HERE'S OUR PRESCRIPTION FOR BATTERY CARE!

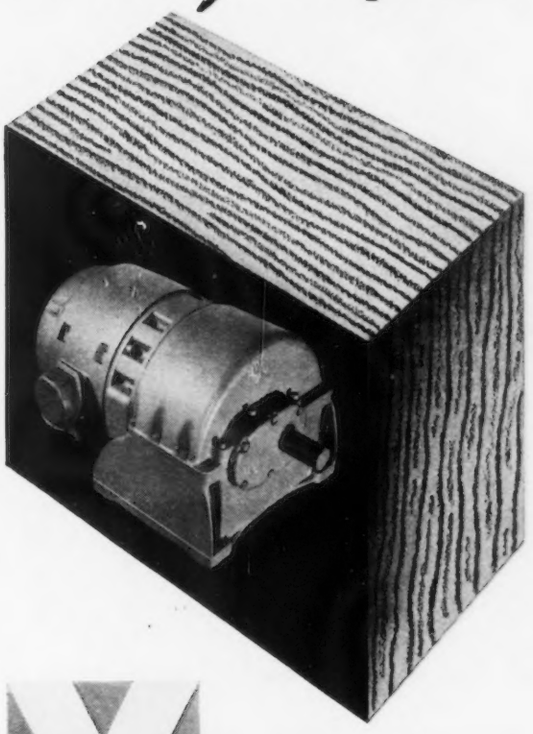
1. Keep adding approved water at regular intervals. Most local water is safe. Ask us if yours is safe.
2. Keep the top of the battery and battery container clean and dry at all times. This will assure maximum protection of the inner parts.
3. Keep the battery fully charged—but avoid excessive over-charge. A storage battery will last longer when charged at its proper voltage.
4. Record water additions, voltage and gravity readings. Don't trust your memory. Write down a complete record of your battery's life history. Compare readings.

If you wish more detailed information, or have a special battery problem, don't hesitate to write to Exide. We want you to get the long-life built into every Exide Battery. Ask for booklet Form 1982.

THE ELECTRIC STORAGE BATTERY CO., Philadelphia
The World's Largest Manufacturers of Storage Batteries for Every Purpose
Exide Batteries of Canada, Limited, Toronto



Whittling improved gearmotor design *out of wood*



Westinghouse makes two kinds of gearmotors these days . . . some of metal and others of wood.

The metal gearmotors go to fill your present orders, to furnish power for the war production drive. Wood gearmotor models reflect the shape of things to come, the improvements and refinements you can expect in the Westinghouse gearmotors you will buy in the immediate tomorrow.

And here's what you can expect when these wood models change to steel:

LOOK for a streamlined appearance that has practical advantages; an improved design that is more efficient, easier to install.

LOOK for a more adaptable construction that fits snugly against the machine it is driving and requires a minimum amount of space.

LOOK for improved application practices which match the gearmotor to the job to be done.

LOOK for simplified gearmotor design, conserving critical materials yet retaining ruggedness of construction.

Westinghouse has the distinct advantage of designing, testing and building gearmotors as complete units. You have the assurance of knowing just how the motor and gear will perform *as a unit*. Ask your Westinghouse representative for recommendations on your slow-speed drive problems. Or write Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa., Dept. 7-N. J-07202

GEARED FOR VICTORY

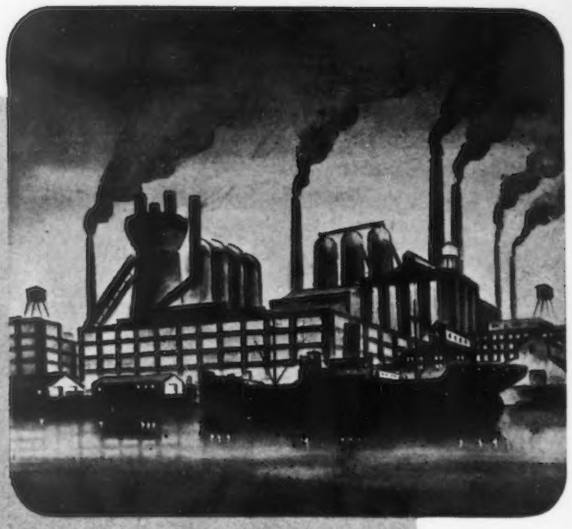
WESTINGHOUSE

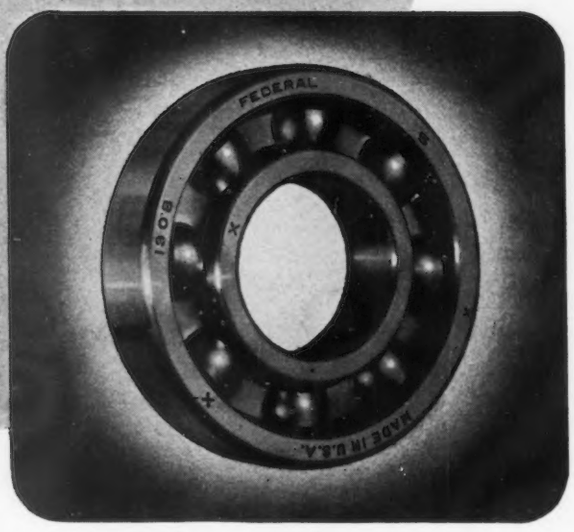
Westinghouse

GEARMOTORS

QUALITY

TRADE MARK





FEDERAL
BEARINGS

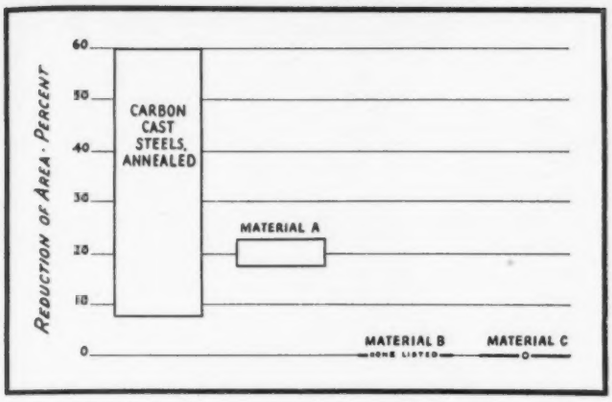
THE FEDERAL BEARINGS CO., INC.

Makers of Fine Ball Bearings

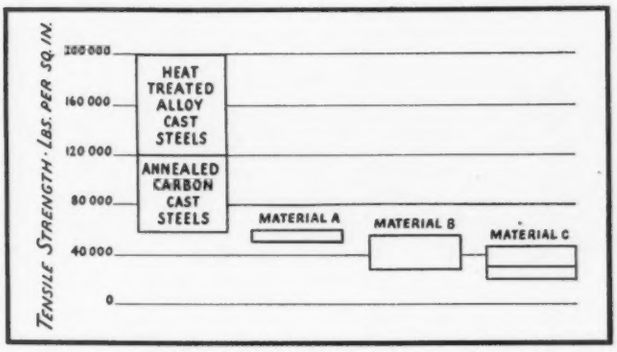
POUGHKEEPSIE, N. Y.

Detroit Office: 2640 Book Tower • Cleveland Office: 402 Swetland Building
Chicago Office: 902 S. Wabash Ave. • Los Angeles Office: 5410 Wilshire Blvd.

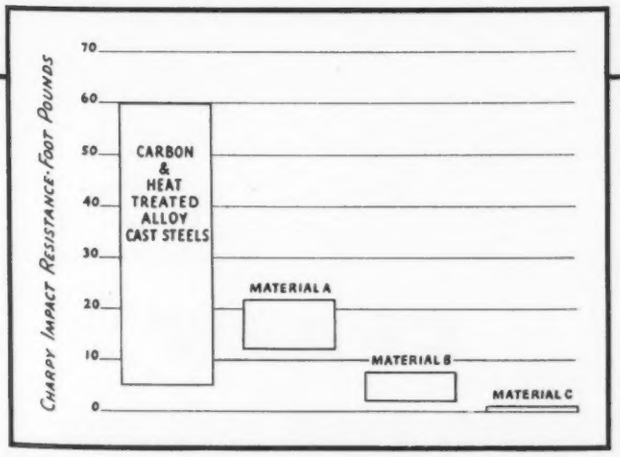
IT IS BETTER ENGINEERING TO SELECT THE MATERIAL FOR THE JOB THAN TO FIT THE JOB TO THE MATERIAL



Cast steel has ten times the range in Reduction of Area of the cast ferrous metal having the next widest range.



Cast alloy steels have over five times the range in Tensile Strength of other cast ferrous metals.



Cast steel has over six times the range of impact resistance of other cast ferrous metals.

Two questions only need be asked about any manufactured product. These are: (1) Will it do the work for which it is designed? and (2) Will it justify its cost through long service?

A wise selection of materials often provides a more positive answer to both questions.

Specifications are sometimes dictated by availability, or by initial cost, but whenever you have a free range of choice, steel castings will meet more conditions than any other cast ferrous metal.

The charts show the wide range of mechanical properties of cast steel available to the engineer and designer. Similar charts covering other mechanical properties also show cast steel has much wider ranges than other cast ferrous metals.

This booklet, available on request for 10c a copy, will bring you valuable data on the mechanical properties of steel castings. You are invited to write to Steel Founders' Society, 920 Midland Bldg., Cleveland, Ohio.

MODERNIZE AND IMPROVE YOUR PRODUCT WITH

STEEL CASTINGS

P-M-G Metal replaces tin-bearing bronzes for many uses

By specifying castings of Cramp P-M-G Metal* (silicon bronze) to replace tin-bearing bronzes, you will not only save precious tin for applications where no substitute is available at present, but you will obtain quality castings with high physical characteristics.

P-M-G Metal is used extensively for valves and valve parts, pump casings, gears, pressure vessels, bearings, machinery castings and ordinary maintenance parts. It may also be rolled or forged into bars or shapes.

P-M-G Metal has uniform grain structure . . . will withstand high fluid pressures . . . is resistant to erosion and corrosion of sea water and many acids. It has higher fatigue value than phosphor bronze or gun metal. It replaces composition "G" and "M" in numerous instances.

In addition to P-M-G Metal, Cramp produces a number of ferrous and non-ferrous alloys which have been successfully used to replace hard-to-get materials. Get our recommendation immediately. No obligation, of course.

*Under license from Phelps Dodge Copper Products Co.

PHYSICAL PROPERTIES

CAST P. M. G. METAL

TENSILE STRENGTH (psi)	40,000-55,000
YIELD POINT (psi)	20,000-28,000
ELONGATION (% in 2 in.)	15-23
SPECIFIC GRAVITY	8.44
BRINNELL HARDNESS	90-125

CRAMP

BRASS & IRON FOUNDRIES

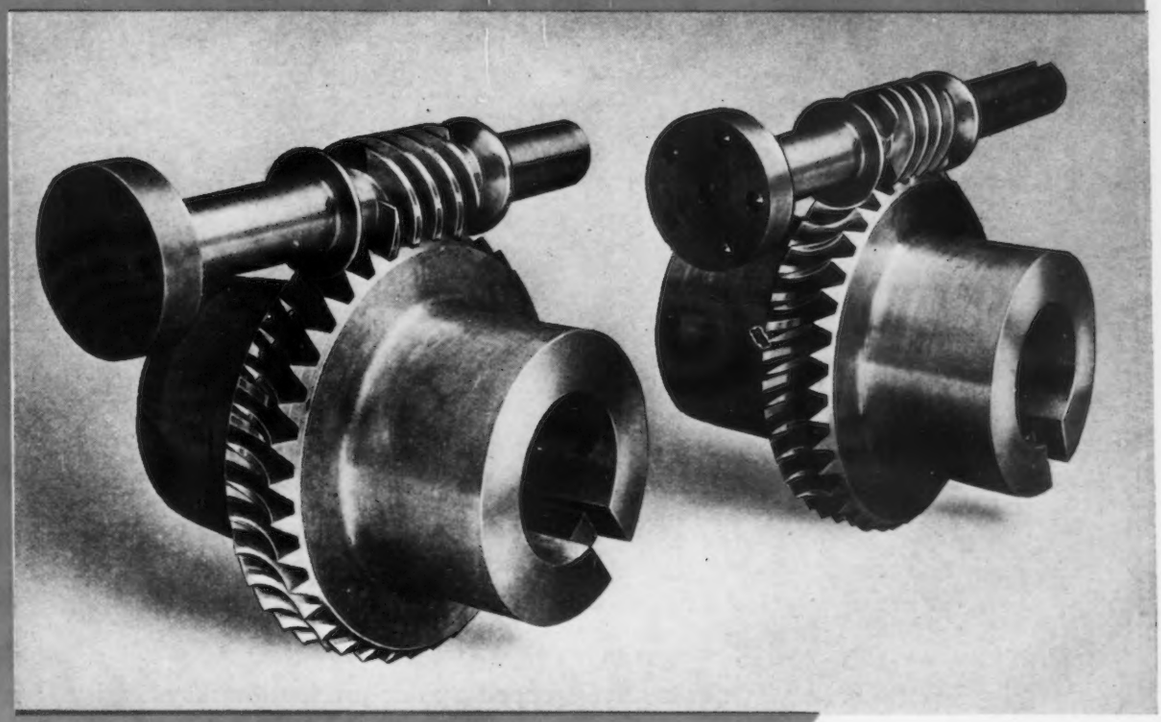
BLW THE BALDWIN GROUP

DIVISION OF THE BALDWIN LOCOMOTIVE WORKS

PHILADELPHIA

New York — Cleveland

San Francisco — New Orleans



QUALITY GEARS for 50 YEARS

...meeting today's strictest demands!

A half-century of painstaking excellence in gear manufacture is represented in SIMONDS' ability to produce treated cut gears delivering the utmost in service—for your specific purposes and working conditions.

SIMONDS' experience, equipment and craftsmanship is concentrated upon gears in a wide range of sizes and types —of cast and forged steel, gray iron, bronze; silent gears of steel, rawhide and bakelite. Large sizes are a regular production feature—spur gears are cut up to 12 feet in diameter.

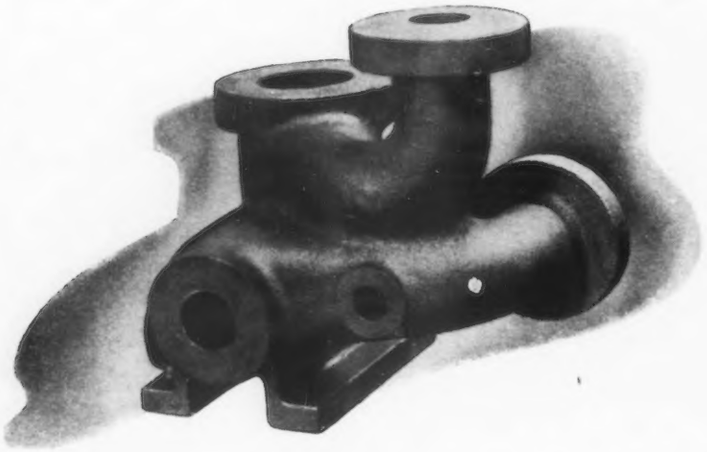
For gears of quality, and other products including Ramsey Silent Chain Drives and couplings—call SIMONDS!

MEMBER OF AGMA

THE SIMONDS GEAR & MANUFACTURING CO.

LIBERTY AT 25th STREET

PITTSBURGH, PA.



99½% PERFECT

Even though war needs have stepped up our production far ahead of previous volume, Dodge Steel returns from customers are running less than ½ of 1%.

Such a record is of special interest to users of steel castings, for much of the work we are turning out is of a character that many steel founders will not even attempt. And delivery schedules have been speeded up again and again.

99½% perfect steel castings! Credit for producing them must be given to a well trained organization, plus improved modern techniques for handling difficult patterns.

At Dodge Steel was developed the "Williams Method" of using atmospheric pressure to produce sound castings of uniform quality. This patented method is now used, under license, by more than 40 leading steel foundries. It is an important technical advance in steel foundry practice.

In spite of an impressive backlog of orders, our sales instincts are still alive. When may we tell you more about the quality and dependability of Dodge Steel castings?

DODGE STEEL CASTINGS

Dodge Steel Company, Tacony, Philadelphia

BETTER PRINTS FASTER WITH DRY DEVELOPMENT

BASIC FACTS ABOUT PRINT MAKING YOU SHOULD KNOW

OZALID SENSITIZED MATERIALS ARE AVAILABLE IN CUT SHEETS AS WELL AS ROLL STOCK. Thus, when you have engineering drawings, maps or charts to be reproduced, you can eliminate trimming waste by using cut sheets of Ozalid material which correspond to the size of your tracings.

Ozalid cut sheets are conveyed through an Ozalid whiteprint machine the same as roll stock—without "leaders" —without the complex operations necessary with all wet development processes. By contrast, blue print material when cut from a roll must be processed by hand.

This is the fourth of a series of facts on modern printmaking.

PRINTS DEVELOPED DRY are permanent — true-to-scale of the original — made so quickly you're able to speed your entire production schedule!

The Ozalid Process of making positive-type whiteprints by dry developing sensitized materials in a whiteprint machine is simplified printmaking that will give you ***better*** prints ***faster!***

Ozalid whiteprints are made in two fast operations — exposure and dry development. They are never moistened by solutions—never washed or fixed as in blue printing—never wrinkle—curl—or fade in sunlight.

Standard Ozalid sensitized materials develop blue, black, or maroon lines on a white background. Transparent papers, cloth or foils produce duplicate originals which are three to five times faster printing than Van Dykes when making subsequent prints.

Whether you need large — small — or medium print production, there's a specific Ozalid machine to meet your demands—to enable you to speed production. By dry developing your prints you save in time — labor — materials.

Write today for new catalog "SIMPLIFIED PRINTMAKING" which completely explains the Ozalid Process.

SPECIFY Ozalid WHITEPRINTS

OZALID PRODUCTS DIVISION
GENERAL ANILINE & FILM CORPORATION
JOHNSON CITY, N.Y.
Ozalid in Canada • HUGHES OWEN CO. LTD., Montreal

WE CAN'T DO A THING 'TIL THE CARPENTERS BUILD THOSE WORK-BENCHES ...PRODUCTION IS SURE HELD UP!
YOU SHOULD HAVE ORDERED "HALLOWELL" READY BUILT STANDARDIZED WORK-BENCHES

This will never happen to you, if you choose.. HALLOWELL

Fig. 928. "Hallowell" Work-bench. Laminated wood top. Drawer is extra.

SHOP EQUIPMENT

You can standardize on "Hallowell" Work-benches throughout your shop. Just choose the benches you need from the 1367 combinations available. Spare yourself all the trouble involved in building your own benches . . . no figuring and ordering lumber. "Hallowell" Benches are delivered promptly and ready to set up. Parts fit perfectly and are interchangeable. When placed they stay firm and rigid without costly, time-taking bolting to the floor. Tops are of smooth laminated wood, Masonite or steel if it's advantageous. Locked drawer units protect workers' tools. Get our Catalog for styles and sizes.

STANDARD PRESSED STEEL CO.

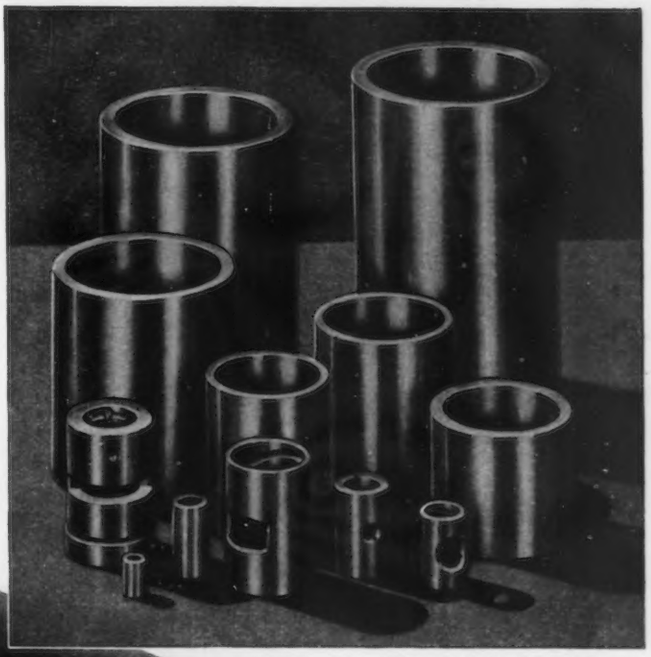
JENKINTOWN, PENNA., BOX 523 · BRANCHES: BOSTON · DETROIT · INDIANAPOLIS · CHICAGO · ST. LOUIS · SAN FRANCISCO

PROTECTING THE SHAFT OF THE WAR MACHINE

● Ask leading local wholesalers for Bunting Bronze Standardized Bearings. Completely machined and finished. Ready for assembly. Available from nearby stocks in sizes providing quick, easy, economical production and maintenance of machine tools, electric motors and all kinds of industrial mechanical equipment. Also readily adapted to many unusual applications.

Bunting Bearing Bronze Tubular and Solid Bars are machined I.D., O.D. and ends, saving labor, time and avoiding waste. Write for catalog.

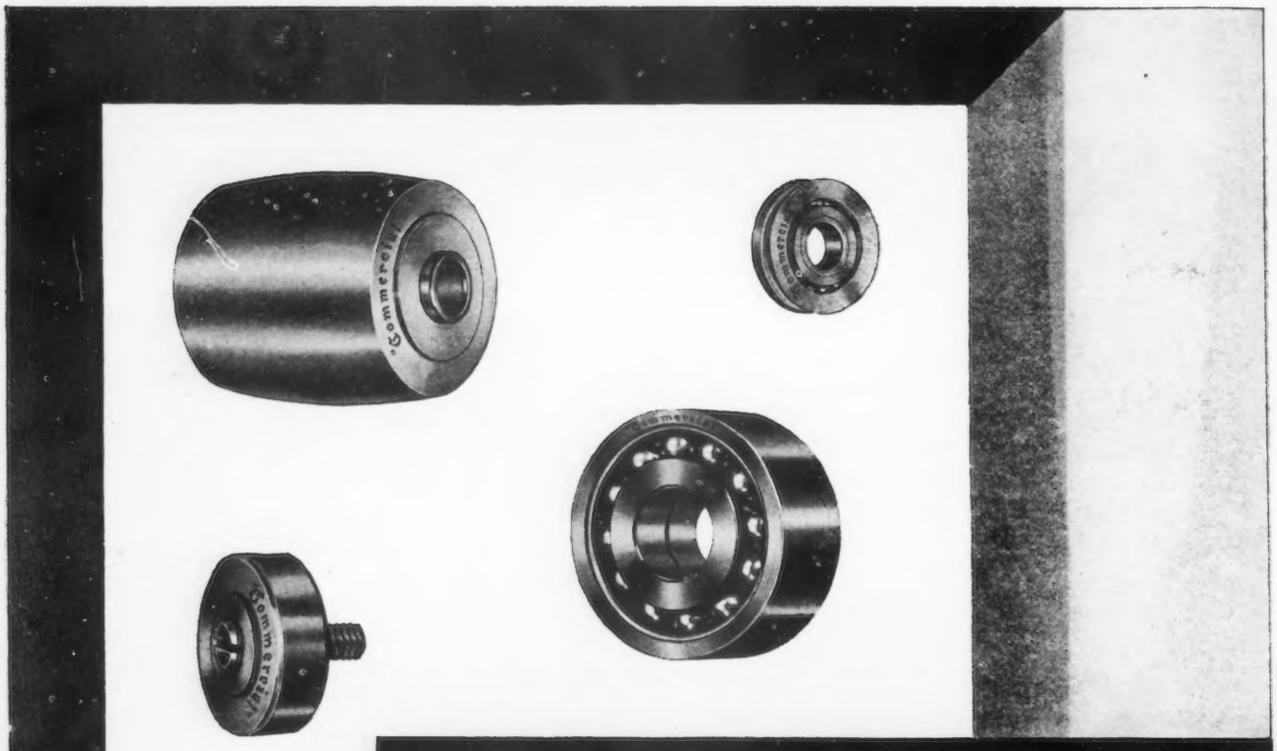
THE BUNTING BRASS & BRONZE COMPANY
TOLEDO, OHIO
WAREHOUSES IN ALL PRINCIPAL CITIES



Bunting Standardized Bearings and Bars are made of SAE 660, the bearing bronze specified by leading manufacturers of all types of machinery.

Bunting

BRONZE BUSHINGS • BEARINGS • PRECISION BRONZE BARS



"Commercial" ANNULAR BALL BEARINGS

BALL BEARINGS FOR EVERY PURPOSE

"Commercial" Annular Ball Bearings are available in nearly all standard types and sizes. We also manufacture SPECIAL types of bearings designed for particular purposes—to meet your own needs and specifications.

On this page, we illustrate special "Commercial" bearings used in various products. For instance:

- BALL BEARING ROLLER FOR TYPEWRITERS
- BALL BEARING ROLLER FOR OVERHEAD TROLLEY CONVEYORS
- BEARING FOR STRAIGHT EDGE CABLES
- TAPE ROLLER, OR PULLEY, FOR PAPER FOLDING MACHINES

This gives some idea of the wide variety of bearings manufactured by us. All "Commercial" Bearings are precision built, accurate, tough and provide efficient, satisfactory service.

Whether you need a few, or a great many units, our Engineering Staff will be pleased to assist in solving your ball bearing problems. Send for complete information and latest catalog.

THE SCHATZ MANUFACTURING CO.
POUGHKEEPSIE, N. Y.

Detroit Office: 2640 Book Tower • Chicago Office: 902 S. Wabash Ave.
Cleveland Office: 402 Swetland Building

Heating Furnace Designed and Built in 3 Days!

Here's a report from G. W. Heald, Chief Engineer, The Ramtite Co., that will be of special interest to operators of industrial furnaces changing over to war production work.

THE RAMTITE CO. INTER-HOUSE LETTER

Is the follow up date for this subject. Please answer before then and as soon as possible.

FORM SC 12 - 1-42 - G. P.

TO Chicago Office

FROM G. W. Heald

ATTENTION G. V. Campbell

COPIES FOR

SUBJECT ..... Corporation DATE 5-15-42

In response to the emergency call from the ..... Corporation last Thursday, I left that same night and arrived at their plant Friday at 9:00 A.M. These people are making 100 pound bombs and were having heating furnace trouble. Their furnace could scarcely keep up with one of their two presses. After studying the operation they turned me loose on a drafting board in their office. My drawing was completed before 5:00 P.M. the same day. Meanwhile I had them start fabrication of the steel framework and construction of the necessary wood forms. Also before completion of the drawing I ordered delivery of the Ramtite and other necessary materials and instructed Charlie (Mason Foreman) to report here Saturday morning. The following Monday morning the new furnace was in operation and was heating stock more rapidly than necessary to keep both presses going.

OUR BUSINESS IS THE manufacture of refractories and the design and construction of industrial furnaces used in forging, heat treating, annealing, etc., and from the above report you will see that we are prepared to deliver in a hurry.

We have three factories manufacturing Ramtite and other refractory specialties and can make immediate shipments of almost unlimited quantities. Ramtite is particularly well suited for use in industrial furnaces. The furnaces can always be designed for the particular job that they will be used for without having to give consideration to special shaped fire brick. Because of its high insulating value and its ability to stand up under hard service, Ramtite construction combines the best features of fire brick construction and insulating fire brick construction.

Send for booklet "Ramtite for Industrial Furnaces," which contains complete engineering information on Ramtite and drawings of typical installations.

THE RAMTITE CO.
Division of The S. Obermayer Co.
1805 SOUTH ROCKWELL STREET
CHICAGO, ILL.

RAMTITE

WE'D LIKE TO *Emphasize Our Service!*

BUILDING good springs, exactly to your specifications, is what we're expected to do. Furthermore it's what we have always done and will continue to do—to uphold our reputation for quality. But today, the feature we'd like to stress is Accurate Service. It's not the ordinary kind of service you would expect from an ordinary source of supply; that isn't good enough, — today! The service we mean is the kind that's based on the complete cooperation of everyone here . . . in the office . . . in the plant . . . and in the field; not the "take-it-or-leave-it", "best-we-can-do" kind. It's the kind of service that gets things done for you — so you can do your job better and faster — so that we may more quickly return to building things that make life better — not worse.

Accurate service is for you, if you need springs and wire forms.

Get in the Scrap Now!

Accurate Springs

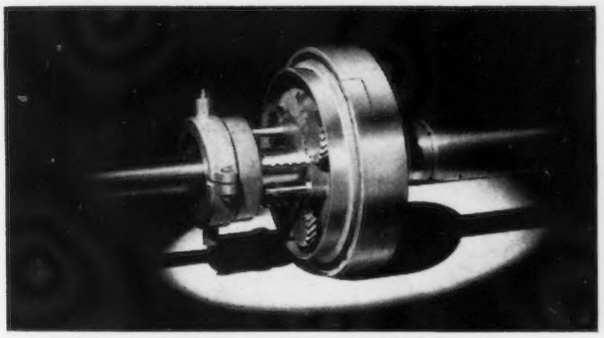
Write for our new Handbook of Technical Data on Springs. No obligation.

ACCURATE SPRING MFG. CO., 3819 W. Lake St., Chicago

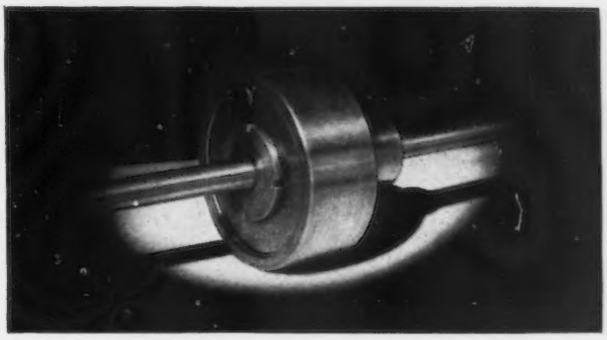
All Out For Victory!

MACHINES MUST TURN

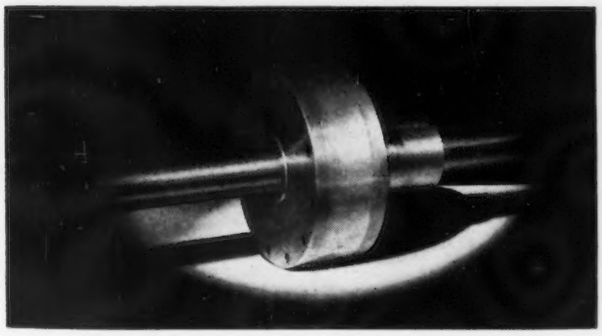
TO DAY ★ ★ TOMORROW ★ ★ TO WIN



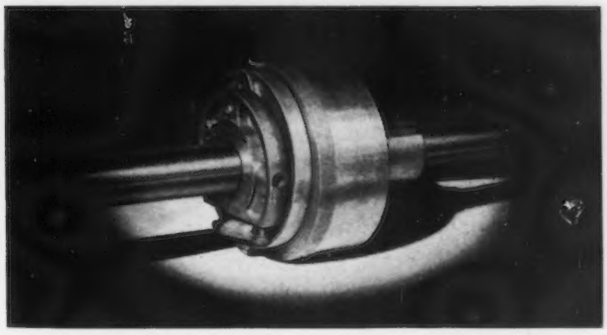
HILLIARD FRICTION CLUTCHES AND COUPLINGS
in all types of plants are keeping them turning.



HILLIARD CENTRIFUGAL CLUTCHES AND COUPLINGS
on many special types of drives are keeping them turning.



HILLIARD OVER-RUNNING CLUTCHES AND COUPLINGS
in many modern machine tools and plant installations are keeping them turning.



HILLIARD SINGLE REVOLUTION CLUTCHES AND COUPLINGS
for intermittent rotary drives in machine tools and automatic process machinery are keeping them turning.

TODAY when America's vast War Program demands that every effort be made in the interests of Victory HILLIARD CLUTCHES are helping to turn the tide by Keeping 'Em Turning along this Victory Line.

THE HILLIARD CORPORATION 114 W. FOURTH ST. ELMIRA . . N. Y.

MANUFACTURERS OF INDUSTRIAL CLUTCHES AND OIL PURIFYING EQUIPMENT

The volume of your present needs for Presteel has forced our tool deliveries to 16-25 weeks

To save costly machining and salvage on castings, forgings, screw parts, and troublesome stampings,

TRY PRESTEEL

√ I. **PRESTEEL** stampings are strong in tension, light, resilient, non-porous, interchangeable, produced to save trouble for your shops.

√ II. **PRESTEEL** products are uniformly accurate; important tolerances are held to closest practical limits, saving costly machining and salvage.

√ III. **PRESTEEL** has 100 varieties of presses, furnaces, etc., and selects the proper equipment for the difficult or heavy shapes you need.

√ IV. **PRESTEEL** comes through on troublesome jobs. Outstanding companies in precision work agree that this one organization will experiment, develop, and produce difficult stampings to their requirements.

√ V. You can count on **PRESTEEL** service. Consistent with heavy schedules, you are kept in touch with your orders, and your stampings or cold rolled strip steel meet your required specifications and dates.

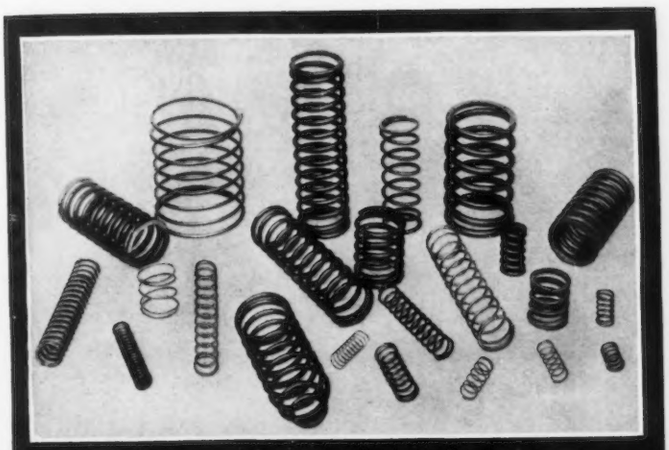
Here are SAVINGS for you: SAVING worry and headaches, SAVING production halts and rejections, SAVING extra operations, SAVING dollars and cents on first costs and unforeseen contingencies.

WHY PRESTEEL? **PRESTEEL PAYS!** **WHY PRESTEEL?**

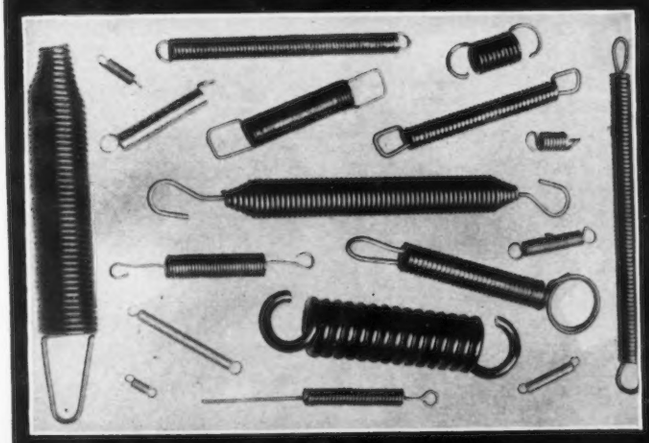
WORCESTER PRESSED STEEL COMPANY

104 BARBER AVENUE, WORCESTER, MASSACHUSETTS

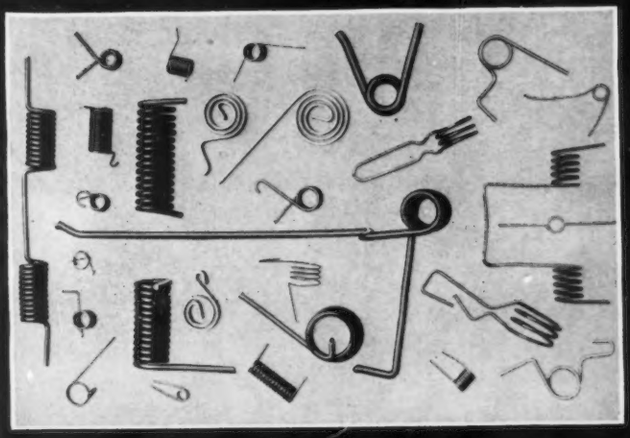
Precision Stampings ***Aluminum, Brass, Alloy Steels*** ***Cold Rolled Strip Steel***



COMPRESSION SPRINGS



EXTENSION SPRINGS



TORSION SPRINGS

SMALL

COIL SPRINGS

in any material from .004" up to 5/16" diameter

SMALL

FLAT SPRINGS AND SHAPES

precision made to

ARMY-AIRCRAFT

SPECIFICATIONS & TOLERANCES

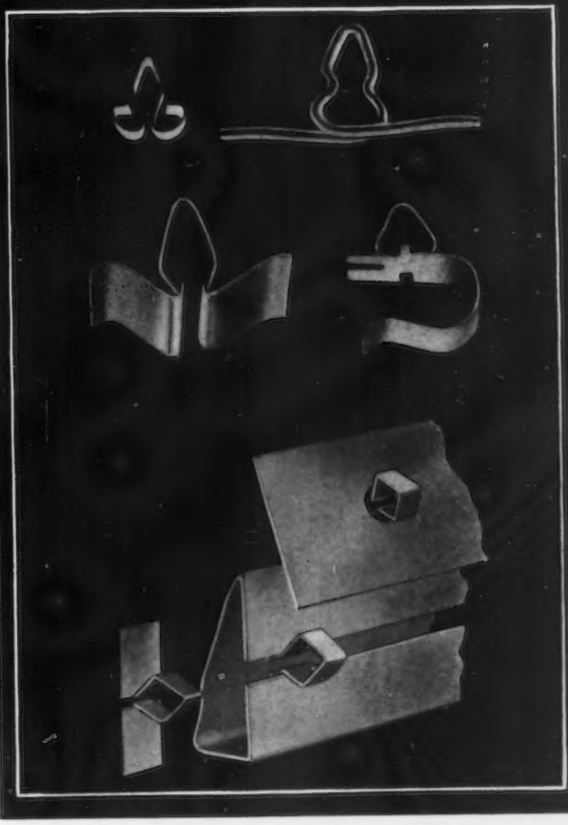
plus complete facilities for

Wire Parts & Assemblies

IN ALL FINISHES

WELDED, THREADED, POINTED AND DRAWN PARTS

SNAP CLIPS



THE CUYAHOGA SPRING COMPANY

10280 BEREA ROAD

CLEVELAND, OHIO

PROTECT THEM WITH AO GOGGLES

Even a minor eye injury will keep this hard-to-replace, skilled workman off the job at least an hour, perhaps several days. A serious eye injury may mean months of lost time or even permanent disability. In times like these, it's disastrous to take such a chance.

Protect his eyes and the eyes of his fellow-workers with American Optical goggles. Can you imagine a sounder investment? One dollar, or even less, per worker's eye!

AO's *complete* line enables each worker to have the sturdiest, most comfortable goggle built especially for protection against the particular type of hazard prevailing in his operation. AO Safety Representatives are always glad to cooperate with your Safety Department. Get in touch with your nearest American Optical Company Branch Office today.

American Optical
COMPANY
SOUTHBRIDGE, MASSACHUSETTS

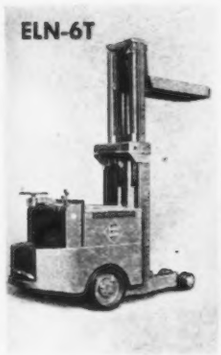
1192

Modern ELWELL-PARKER *Trucks and Cranes*

AVAILABLE IN STANDARD TYPES AND SIZES

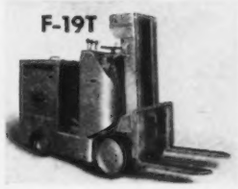
LIFT TRUCKS

Type	Capacity	Overall Length	Overall Width	Platform Size Length	Platform Size Width	Height at Low Position	Lifts	Turns Intersecting Aisles	Approximate Weight with Power Unit
EQ-4	4,000 lbs.	87¼″	31¼″	41″	18½″	7″	3¼″	50″	2,900 lbs.
EP-4	4,000 lbs.	112½″	38″	54″	26½″	10½″	6″	64″	4,100 lbs.
EP-6	6,000 lbs.	119½″	42¾″	54″	26½″	10¾″	5¼″	69″	4,900 lbs.
GEP-6 (Gas)	6,000 lbs.	125⅞″	42″	54″	26½″	10¾″	5¼″	72″	4,050 lbs.
EP-10	10,000 lbs.	129″	42¾″	60″	26½″	11″	5¼″	71″	5,500 lbs.



TIERING TRUCKS

Type	Capacity	Overall Length	Overall Width	Platform Size Length	Platform Size Width	Height at Low Position	Height Overall	Lift	Turns Intersecting Aisles	Approximate Weight with Power Unit
ELN-6T	6,000 lbs.	129 7/16″	42¾″	54″	27″	11⅛″	83″	113″	70½″	7,000 lbs.
ELN-6	6,000 lbs.	126″	42¾″	54″	27″	11⅛″	83″	62″	69″	6,300 lbs.
ELN-10	10,000 lbs.	137½″	43″	60″	27″	11″	95″	69½″	76″	7,500 lbs.



FORK TRUCKS

Type	Capacity Up to	Long Load	Overall Length 36″ Forks	Overall Width 36″ Forks	Telescoping Truck Lifts Up to	Height, Uprights Collapsed	Turns Intersecting Aisles	Approximate Weight with Power Unit
F-19T	6,000 lbs.	60″	123″	46″	117″	83″	76″	12,200 lbs.
F-25T	10,000 lbs.	48″	141″	51½″	100″	83″	86″	15,500 lbs.
F-23T	5,000 lbs.	42″	118¾″	41″	117″	83″	70″	9,300 lbs.

CRANES

Type	Capacity Lbs. @	Overall Length	Overall Width	Boom	Slews	Platform Size Length	Platform Size Width	Platform Size Height	Turns Intersecting Aisles	Approximate Weight with Power Unit
C-4	3,000 lbs. 7′	107¾″	50″	12′-19′	292°	15″	41″	17¼″	69″	10,800 lbs.
CX-4	6,000 lbs. 7′	134¾″	63″	12′-19′	204°	40⅝″	63″	16⅜″	94″	13,400 lbs.
CZ	10,000 lbs. 5½′	132⅜″	64½″	12′-19′	296°	28¼″	50″	25¼″	88″	18,000 lbs.
EP-6C	2,000 lbs. 3½′	129⅜″	42¾″	5′-8′	180°	26½″	54″	10¾″	70″	7,000 lbs.

(Boom mounted on EP-6 Lift Truck)

Elwell-Parker concentrates on these basic types, to give you deliveries of Trucks and Cranes that will meet your scheduled requirements, saving or multiplying manpower to handle your War Loads. Ask Elwell-Parker Engineers to survey your Plant.

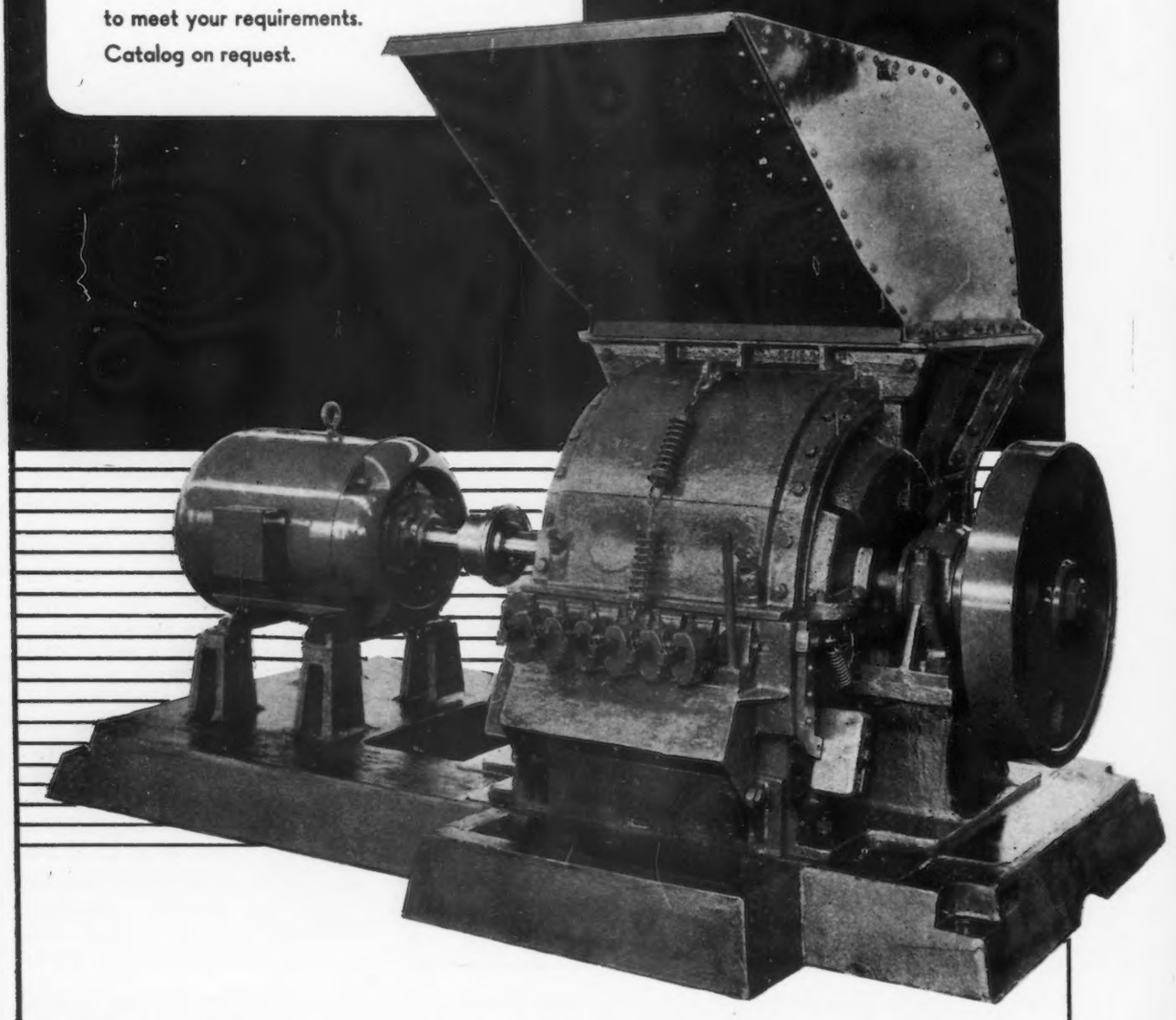
The Elwell-Parker Electric Company, 4225 St. Clair Ave., Cleveland, Ohio.

ELWELL-PARKER *Power Industrial* TRUCKS

ESTABLISHED 1893 • BUILDING POWER INDUSTRIAL TRUCKS SINCE 1906

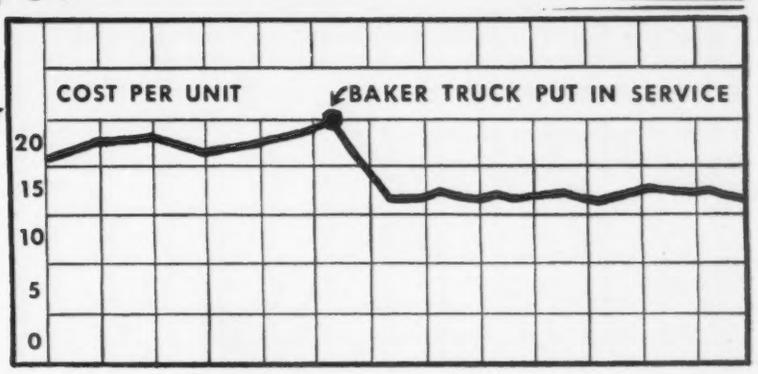
AMERICAN RING *Turnings* CRUSHER

These heavy-duty crushers, utilizing the celebrated "Rolling-Ring" principle, reduce long turnings into chips speedily and economically. Thus chips are more conveniently handled, require less space and fetch higher prices. The crushers soon pay for themselves and show a profit. Available in various sizes to meet your requirements.
Catalog on request.



AMERICAN PULVERIZER COMPANY
1439 MACKLIND AVENUE ★ ST. LOUIS, MISSOURI

BAKER TRUCKS *can help you to* CUT PRODUCTION COSTS



Here's how—

1. REDUCING RENT COST
By tiering in warehouse and by putting every foot of space in plant and yard to use, Baker Trucks cut rent costs, and often eliminate need for plant expansion.

2. CUTTING MACHINE AND LABOR COSTS
They can step up rate of output per man and per machine in most plants.

3. CUTTING HANDLING COSTS
Cost of moving materials is a definite part of production cost and can be reduced substantially.

4. CUTTING SPOILAGE COSTS
Smooth and efficient operation of Baker Trucks reduces damage to materials in the plant and in transit.

5. CUTTING TIME COSTS
General reduction in production cost can be effected by saving man-hours from raw material to delivered product, by handling with Baker Trucks.

6. CUTTING LOSS OF TIME THROUGH ACCIDENTS
By eliminating heavy, hazardous manual lifting, they improve plant safety and reduce costly accidents to man-power.

7. CUTTING DIE HANDLING COSTS
The changing of dies, patterns and other machine equipment is speeded with Baker Trucks. Handling and storing these items are also done more efficiently.

★ ★ ★

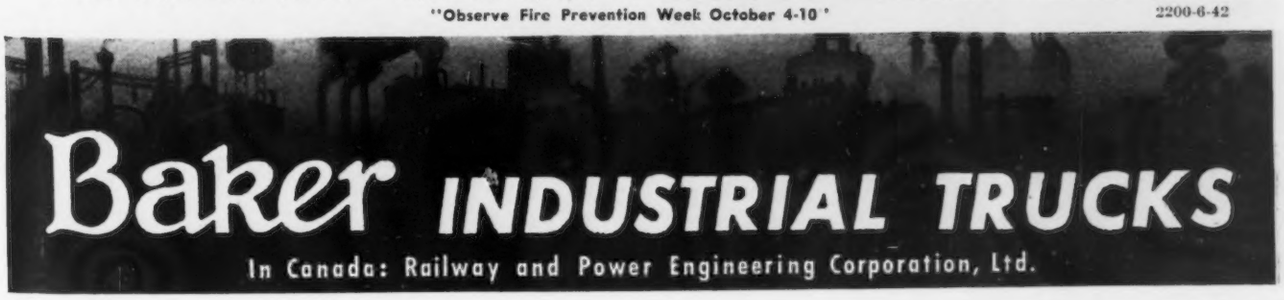
The BAKER Material Handling Engineer Can Help You

He knows how to bring your material handling to maximum efficiency, speeding plant production and cutting manufacturing costs to a minimum. He is at your service.

BAKER INDUSTRIAL TRUCK DIVISION
of the Baker Raulang Company
2175 West 25th Street • Cleveland, Ohio

"Observe Fire Prevention Week October 4-10"

2200-6-42



DON'T OVERLOOK FILLISTERS

If you are having difficulty securing socket head cap screws, investigate Cleveland Fillister Head Cap Screws. Same head dimensions, approximately same thread lengths. Good service.

THE CLEVELAND CAP SCREW CO., 2917 EAST 79th STREET, CLEVELAND, OHIO

BY THE BOX, OR BY THE MILLION . . . BUY

CLEVELAND CAP SCREWS

SET SCREWS • BOLTS AND NUTS

Address the Factory or our Nearest Warehouse: Chicago, 726 W. Washington Blvd. • Philadelphia, 12th & Olive Streets
New York, 47 Murray Street • Los Angeles, 1015 E. 16th Street

Why should I specify Neloy ???

First, because Neloy and Neloy Molybdenum steel castings possess higher physical properties at *very little* more than carbon steel base price. Secondly, they are produced under one *complete control*, from raw material to finished product . . . machined or unmachined at the National-Erie Corporation.

Qualities of* Neloy *for Flame Hardening.

1. **No sharp line of demarcation between the case and the core nor quick change in chemical analysis as with case hardened material.**
2. **The surface material depends not on hardness alone, but combines high hardness and toughness to resist wear and impact.**
3. **A core value that is equal to that of alloy steel, offering fatigue or impact values much higher than the regular case hardened product.**
4. **Hardened depth for necessary wear resistance equal to case hardening treatment at about one-third the cost.**
5. **A surface that will not spall with vibration or impact.**

Better get their Bulletin #5 — Miss Jones

Neloy Steel
Gear Tooth annealed.

Neloy Treatments
No. 1 to 9 inclusive, note texture of cross-section.

Flame hardening
Neloy 10-A and B . . .
Note depth of hardness.

NATIONAL-ERIE
CORPORATION
ERIE, PA., U.S.A.

TIME *Marches On*

In 1921, NORMA-HOFFMANN introduced the Cup Mounting—the forerunner of all-self-protected ball bearings. From this, through progressive stages (as shown above) has evolved the NORMA-HOFFMANN "CARTRIDGE" BALL BEARING—an ultra-modern type embodying 30 years of PRECISION BEARING manufacture and offering to industry the following distinctive advantages:

SIMPLER AND MORE ECONOMICAL MACHINE DESIGN, due to elimination of many costly mounting parts and machining operations, otherwise required; EASIER AND FASTER MACHINE ASSEMBLY AND DISASSEMBLY, since the "CARTRIDGE" BEARING is an integrally sealed unit needing no complementary mounting parts; 100% GREATER GREASE CAPACITY, due to double-row width creating a greatly enlarged grease reservoir; COMPLETE AND LASTING EXCLUSION OF DIRT AND FOREIGN MATTER by the use of tightly fitting, wearless, all-metal seals; SEALED FOR ANY POSITION, since the seals retain the lubricant regardless of shaft angle; EASY REGREASING AND INSPECTION WITHOUT DISMOUNTING, by means of refilling plug and removable seals.

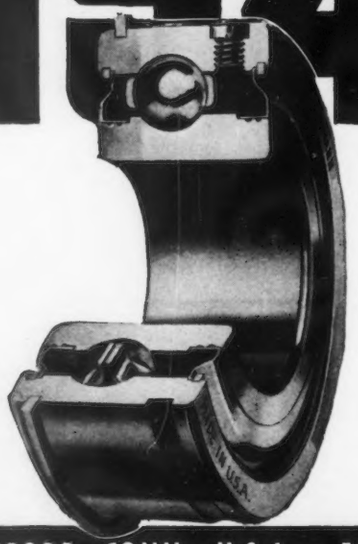
Write for the Catalog. Submit your bearing problems for study and recommendation, without obligation. NORMA-HOFFMANN sales and service engineers, and distributors in principal cities stocking "CARTRIDGE" BEARINGS, are at your service.

"NORMA-HOFFMANN"

CARTRIDGE

BALL BEARING

PRECISION BALL, ROLLER and THRUST BEARINGS



NORMA-HOFFMANN BEARINGS CORP'N., STAMFORD, CONN., U.S.A. • FOUNDED 1911

. . . SPEED WORK IN SHIPYARDS AND INDUSTRIAL YARDS ON DOCKS AND IN PORTS

Operated by one man and powered by one engine, they conserve vital time, fuel and material. They move about fast on pneumatic tired wheels without damage to roadways.

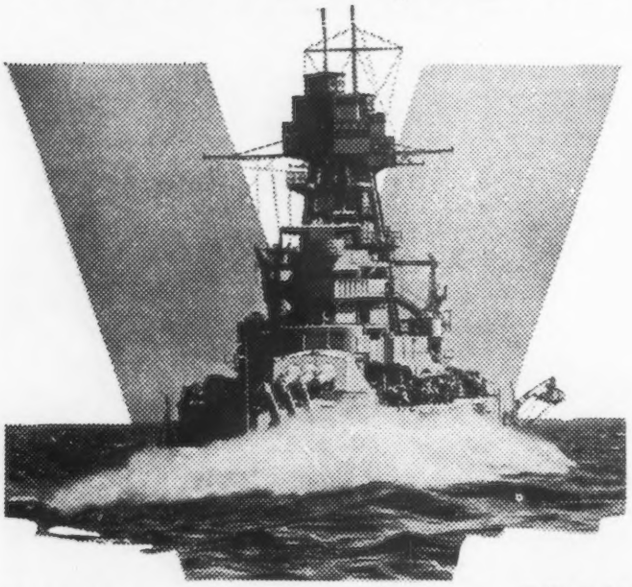
Available in a wide range of sizes for jobs with high priority, these fine new Cranes are helping to win the War. Descriptive literature available on request.

THE OSGOOD CO.
MARION, OHIO
MOBILCRANES

THE GENERAL EXCAVATOR CO.
MARION, OHIO
SUPERCRANES

KEEP 'EM ROLLING

To Avoid Injuries.....Loss of Time!.....



USE *Babbitrite*
AS NECESSARY AS THE LADY

With BABBITRITE, the common sense retainer, you eliminate all danger of blowouts when pouring molten babbitt or low temperature bismuth alloys, thus avoiding serious injuries to workmen and costly disruption of work.

BABBITRITE comes ready for use. It requires no preparation or mixing, such as is necessary with clay or putty. May be reused at least 100 times without losing efficiency. Absolutely moisture-proof. Will not harden. More economical to use. Sold on a positive money-back guarantee.

Write Dept. A for Liberal Free Test Sample and Literature.

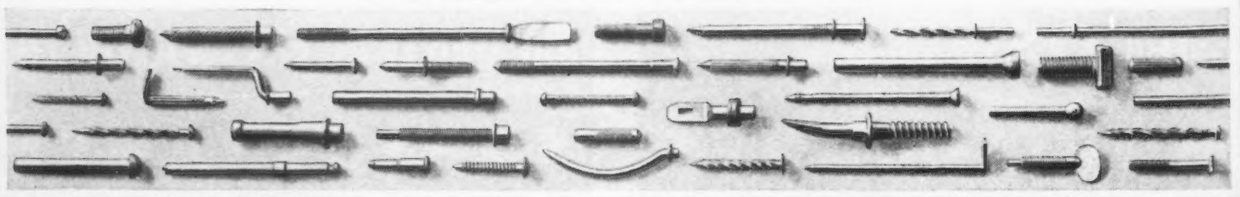
PRODUCTS MANUFACTURING CO.
329 N. MILWAUKEE ST. MILWAUKEE, WISCONSIN

SPECIAL NAILS·RIVETS·SCREWS

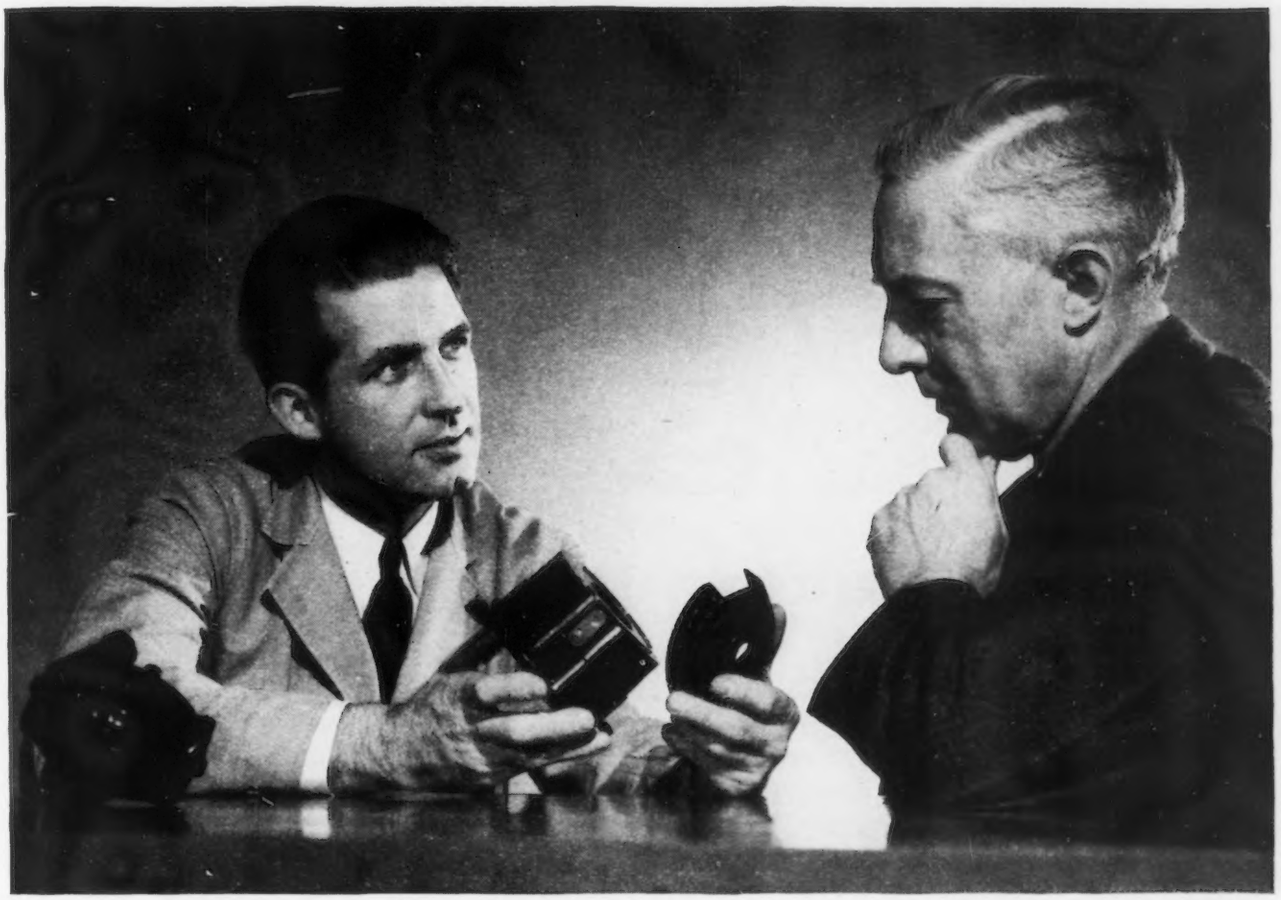
Hassall

FASTER! FASTER! Speed is indispensable to victory. If you can't get your small parts *when* you need them or the *way* you want them, send us your specifications. Special nails, rivets and screws in any metal. Catalog on request.

JOHN HASSALL, INC.
405 Oakland Street, Brooklyn, N.Y.
Established 1850



In a Change-over to *Plastics*

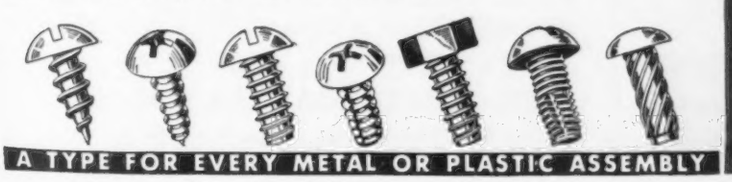


—YOU CAN SOLVE YOUR FASTENING PROBLEMS SIMPLY AND QUICKLY!

Call in a Parker-Kalon Assembly Engineer!

When you start "ironing out" the assembly problems in your change-over to plastics, *Parker-Kalon can help you!* Parker-Kalon Assembly Engineers have shown you how to *save time and labor* on all types of metal assembly with Self-tapping Screws – AND, their knowledge and experience *with plastics* will be just as valuable to you.

They can show you how the right type of Parker-Kalon Self-tapping Screw can make fastenings to plastics quicker and easier than by any other fastening method. They can help you put P-K Screws to work on your assembly line without costly delays – for, no skilled hands or special tools are required. Get the *most* out of your switch to plastics – call in a Parker-Kalon Assembly Engineer, now! Write Parker-Kalon Corporation, 200-202 Varick Street, New York, N. Y.



A TYPE FOR EVERY METAL OR PLASTIC ASSEMBLY

There's a P-K Self-tapping Screw for Every Type of Plastic Assembly

Whether your particular job requires a *thread-cutting* or *thread-forming* screw, there's a P-K Self-tapping Screw that will speed up your assembly by eliminating tapping operations or the use of tapped inserts. And, the correct type of P-K Screw will give you a BETTER as well as cheaper means of assembly. Remember, too, that the Parker-Kalon Quality-Control Laboratory – without counterpart in the screw-making industry – assures consistently reliable performance. "Doubtful screws" – screws that *look* all right but some of which fail to *work* right – are eliminated.

PARKER-KALON

Quality-Controlled

SELF-TAPPING SCREWS

Give the Green Light • to War Assemblies

Time Tested Ability TO DO THE JOB...

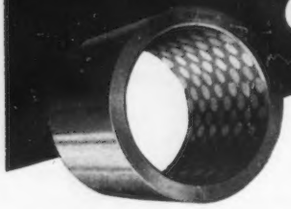
More than twenty-five years' experience qualifies us to do a good job for you. We can turn out your orders for stampings and washers quickly and efficiently. In fact, you may save money by selecting a die from the thousands in our stock.

Located in the heart of the steel industry in the major production area of the country, we can give you good service and save you money on shipping costs. We guarantee satisfactory and experienced work. Write or send blue prints for quotations.

THE GUARANTEE SPECIALTY MFG. CO.
EAST 96th and N. Y. C. R. R. CLEVELAND, OHIO

★ **COLLIER STEEL CORP.** ★
COLLIER, WEST VIRGINIA

Longer Life for METALINE Oilless Bronze Bearings



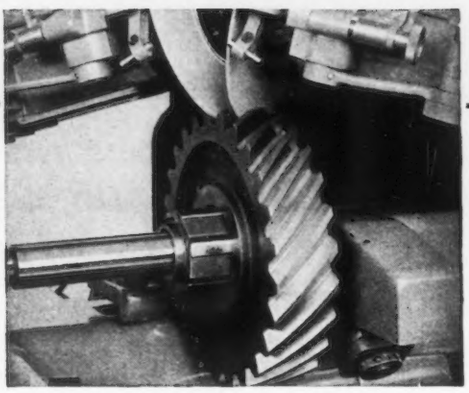
BEARINGS CAN BE RE-METALINED

Rhoades Metaline Oilless Bronze Bearings which have used up their Metaline lubricant without excessive wear to the bronze may be refitted with new Metaline plugs. Send such bearings to us with information as to their use. We will insert Metaline of the proper grade and return them for another long period of usefulness.

Remember never to oil or grease a Metaline Bearing. It provides its own lubrication.

This is one of a series of suggestions for lengthening the life of Metaline Bearings now at work.

R. W. RHOADES METALINE CO. Inc.
50-17 FIFTH ST. LONG ISLAND CITY, N. Y.



HIGH PRECISION SPUR AND HELICAL GEARS

Interchangeable—Quiet

We machine your blanks or cut from bar stock. We cut and grind gears on Maag Machines in our Jersey City Plant to an Accuracy of Profile up to .00012"; of Pitch up to .00024" and concentricity of Pitch Circle, within .0060". Gears cut to usual standards without grinding. (We do not make worm or bevel gears.)

SWISS-AMERICAN GEAR MFG. CO.
5003 Chrysler Bldg., New York, N. Y.

"STANDARD EQUIPMENT" IN PEACE IS ONE THING

BUT TODAY, almost before a test pilot can take a new fighter plane "upstairs," its design is changed. Faster engines are constantly being demanded — and delivered . . . tougher fabricating materials developed.

Yet the warplane whose wings are still blueprint paper has one thing in common with aircraft designs that have gone before — the Torrington Needle Bearing.

Changed-over to production-for-war, the Needle Bearing is once more proving its adaptability, in applications where its unique advantages mean more than ever. Low coefficient of friction, for example, makes it especially well-suited to manual control operations in fighter planes, assuring smooth, steady performance.

Not only in aircraft production but throughout industry, every feature of the Needle Bearing is filling some vital wartime need. Its small size is saving space and critical materials . . . its remarkable ease of installation cutting assembly time, its design eliminating extra parts and assembly steps, its high capacity and efficient lubrication reducing the need for replacement or maintenance attention in service.

Small wonder that the Torrington Needle Bearing has become standard equipment, too, in America's production-for-Victory program.

***FOR INFORMATION** concerning capacities and sizes, send for Catalog No. 104. Or consult a Torrington engineer. He is well qualified in adapting the Needle Bearing's unique advantages to specific problems.*

LET'S GO! U.S.A. KEEP 'EM FLYING

THE TORRINGTON COMPANY

TORRINGTON, CONN., U. S. A. • *Est. 1866*

Makers of Needle and Ball Bearings

New York · Boston · Philadelphia · Detroit
Cleveland · Seattle · Chicago · Los Angeles
San Francisco · Toronto · London, England

TORRINGTON NEEDLE BEARING

Every feature fills a wartime need

WEATHERHEAD

FITTINGS AND HOSE *Meet Vital Needs*

On plane—on ship—on tank—on truck—on machine equipment—wherever power, fuel and oil lines must be kept functioning—Weatherhead fittings and hose meet vital demands of industry.

BRASS TUBE FITTINGS

A complete line of tube service parts made from extruded brass rod free from porosity. Inverted, S. A. E. and compression types with square finish that makes installation easy.

FLEXIBLE FUEL LINES

Oil-proof—gasoline-proof—vibration-proof. Supplied as complete assemblies or in lengths with wide variety of easily attached fittings.

PACKLESS VALVES

Leak-proof; quick acting; sturdy; low overall height; natural grip hand wheel; full capacity openings; excellent for fuel lines.

ERMETO SAFETY FITTINGS

For tubes of any metal. Hold up beyond the burst strength of the tube itself. Provide safe, strong, dependable tube joints. Easily connected and disconnected. No flaring, soldering, welding or threading required.

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Tell us the Weatherhead products in which you are interested and we'll send complete details.

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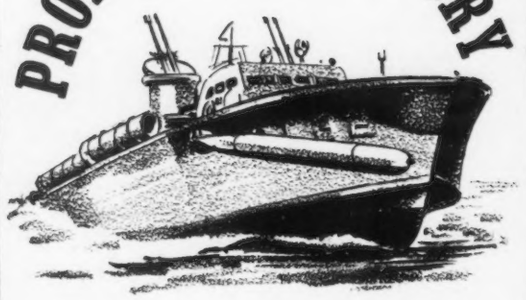
WEATHERHEAD

TUBE FITTINGS • VALVES • DRAIN COCKS • AVIATION, AUTOMOTIVE AND REFRIGERATION SPECIALTIES

RITCO

PRODUCTION for VICTORY



Wherever our boys fight . . . on land, sea or in the air . . . RITCO products are there, too, serving America on her many battle fronts.

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SPECIAL BOLTS, NUTS and STUDS

We are producing the above items for GUN MOUNTS, TANKS and various NAVY ORDNANCE EQUIPMENT.

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The above equipment is producing special RITCO bright finish micrometer frames as well as numerous other special shapes going to our war effort.

SCREW MACHINE PRODUCTS

Multiple spindle machines to 2⅝"; single spindle to 4¼". Accurate, dependable work on all materials.

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Complete equipment for HEAT TREATING, CASE HARDENING, CARBURIZING, ANNEALING and BLUEING. We use A. F. HOLDEN COMPANY'S Electric Furnace Equipment and salts; LEEDS AND NORTHRUP COMPANY'S Carburizing and Heat Treating Furnaces.

SPRAYED METAL EQUIPMENT

Metcolizing equipment to build up worn parts with all kinds of metals.

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Estimates gladly submitted.
Send samples or blueprints.
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Serving American Industry Since 1834

RITCO

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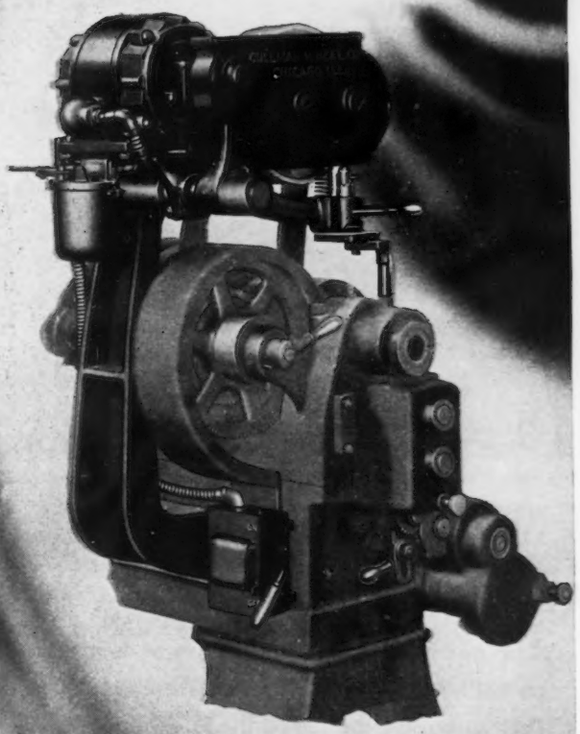
CULLMAN
MOTOR DRIVES



Get maximum production from lathes, screw machines, punch presses, shapers and other equipment now belt driven from shafts, by modernizing with CULLMAN Motor Drives.

You can increase machine output 25% through greater flexibility, instant control, and belt drive smoothness. You can install a CULLMAN Motor Drive in a few hours. On most machines only four bolts are necessary. CULLMAN Motor Drives are made for motors ranging from ¼ to 15 H. P.

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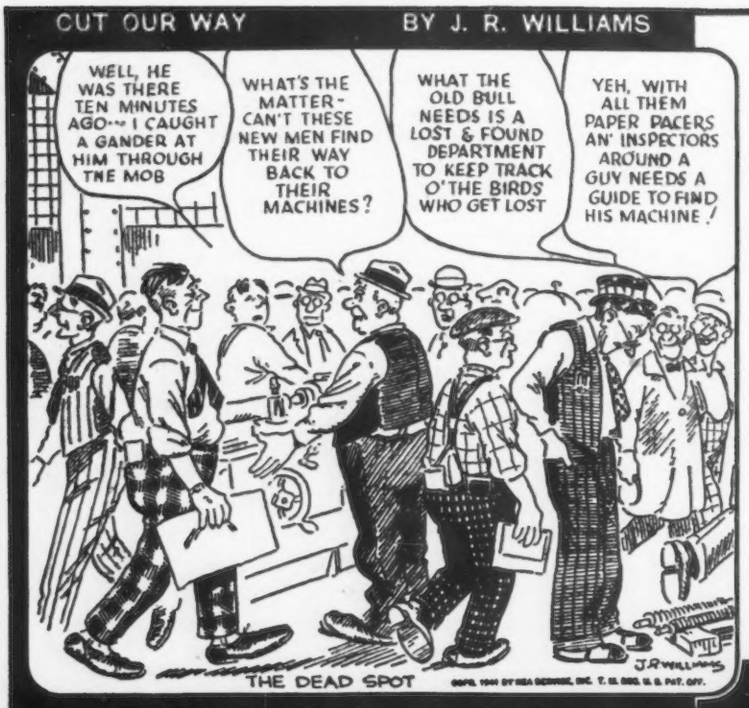
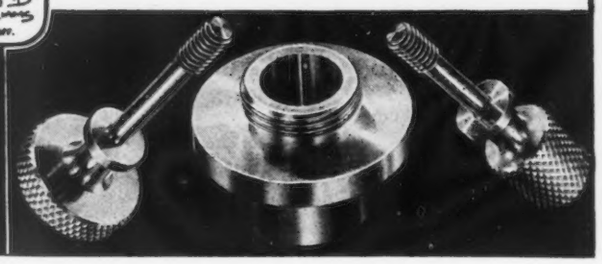

CUT OUR WAY
BY J. R. WILLIAMS
WELL, HE WAS THERE TEN MINUTES AGO--- I CAUGHT A GANDER AT HIM THROUGH THE MOB
WHAT'S THE MATTER- CAN'T THESE NEW MEN FIND THEIR WAY BACK TO THEIR MACHINES?
WHAT THE OLD BULL NEEDS IS A LOST & FOUND DEPARTMENT TO KEEP TRACK O'THE BIRDS WHO GET LOST
YEH, WITH ALL THEM PAPER PACERS AN' INSPECTORS AROUND A GUY NEEDS A GUIDE TO FIND HIS MACHINE!
THE DEAD SPOT
J.R.WILLIAMS

These are tough days for the 'Old Bull'...

WORK and more work is the only formula that will win this war...and assure our future economic solidity. While American industry is literally performing production miracles, it is industry's obligation also to think and plan ahead for the tremendous tasks of maintaining a sound post-war economy. Let's lay those plans *now*...let's tackle our post-war problems together and pool our increasing knowledge of production methods and processes. By so doing, we will keep faith with ourselves, and with everyone fighting and working to preserve our way of life.

(*Below*) A few of the many thousands of our precision-made parts that help "Keep 'em flying and fighting."

ERICSSON ±
ESTABLISHED 1911



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MOUNT VERNON, N.Y.

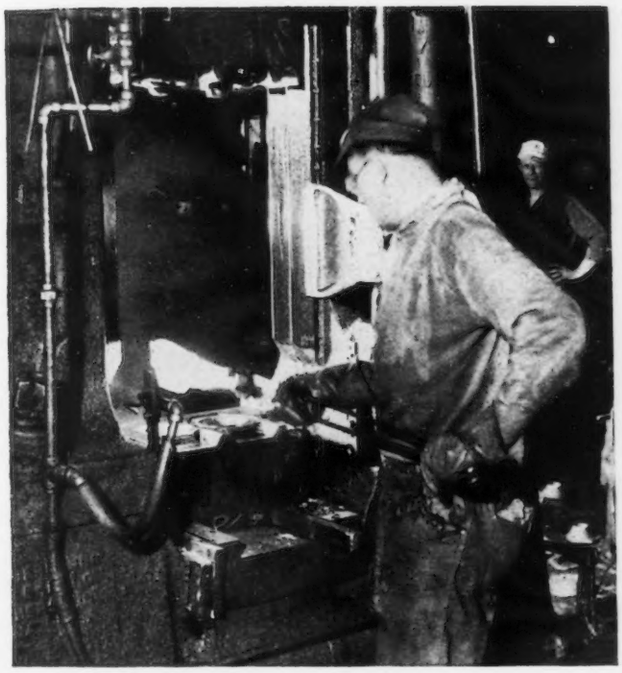
This die mark is a mark of Quality Die Castings

Our engineers have had years of experience in designing parts to be die-cast, building dies and producing the die castings. They are entirely familiar with the alloys available, and are prepared to furnish you with the particular alloy of zinc or aluminum which will best suit your application insofar as priorities permit.

With this accumulated knowledge and experience we are now engaged 100% in war work which means we are continuing to serve every industry engaged in the manufacture of essential products.

We appreciate this opportunity of working with you, and you can count on our cooperation in solving your die-casting problems.

MOUNT VERNON DIE CASTING CORP.
Mount Vernon New York



FORGING AHEAD— for Victory

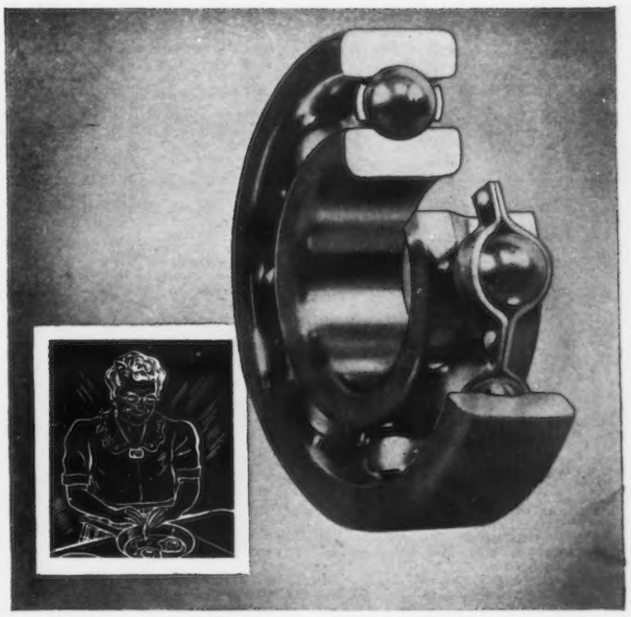
We can't go into detail about the forged parts we are turning out for our armed forces, but the fact that Forgings by Phoenix have been chosen for many of the important jobs where accuracy, stamina, and dependability are essential is indicative of the quality of our work.

Forgings by Phoenix are solving many perplexing problems for industry as well — meeting rigid specifications — improving the product — and in many instances materially reducing costs.

FORGINGS by PHOENIX

Phoenix engineers are at your service and will be glad to consult with you at any time. Perhaps they can show you how Forgings by Phoenix can overcome design, production, and cost problems. In any case, you are not obligated in any way.

PHOENIX MANUFACTURING COMPANY
Catasauqua, Pa.
Phoenix Products Mean Quality



A TIP FROM GRANDMA

On Mounting Ball Bearings!

EVER watch your grandmother fry an egg? Whether you realized it or not, she was giving you a tip or two on the proper mounting of ball bearings! Remember how thoroughly she cleaned her frying pan? How gently she handled the egg in carrying it to the stove . . . *taking care to avoid cracking the shell until the egg was directly over the pan?*

Well . . . one of the first precautions in mounting ball bearings is to clean the housing or shaft that is to receive the bearing as carefully as grandma cleaned the pan that was to receive the egg. Another important point is not to remove the protective wrapper *until you have carried the bearing to the shaft* . . . just as grandma carried the egg from the refrigerator to the frying pan before she cracked the shell.

Here's another tip. Consult page 8 of your BCA Data Book before mounting. Instructions given there will help you to grind the Axis . . . instead of your bearings!

BEARINGS COMPANY OF AMERICA, LANCASTER, PENNA.

Standardize on Standard Sizes

BCA
RADIAL • ANGULAR CONTACT • THRUST
BALL BEARINGS

PRODUCTS INDEX

ADVERTISERS CLASSIFIED BY PRODUCTS

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Carborundum Co., The, Niagara Falls, N. Y.

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Wall-Colmonoy Corp., Detroit, Mich.

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Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

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Hartford (Conn.) Steel Ball Co., The.

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SKF Industries, Inc., Front St. & Erie Ave., Phila., Pa.
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Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

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Revere Copper & Brass, Inc., 230 Park Ave., N. Y. C.

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Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Youngstown (Ohio) Sheet & Tube Co., The.

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Morgan Construction Co., Worcester, Mass.
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Morgan Construction Co., Worcester, Mass.
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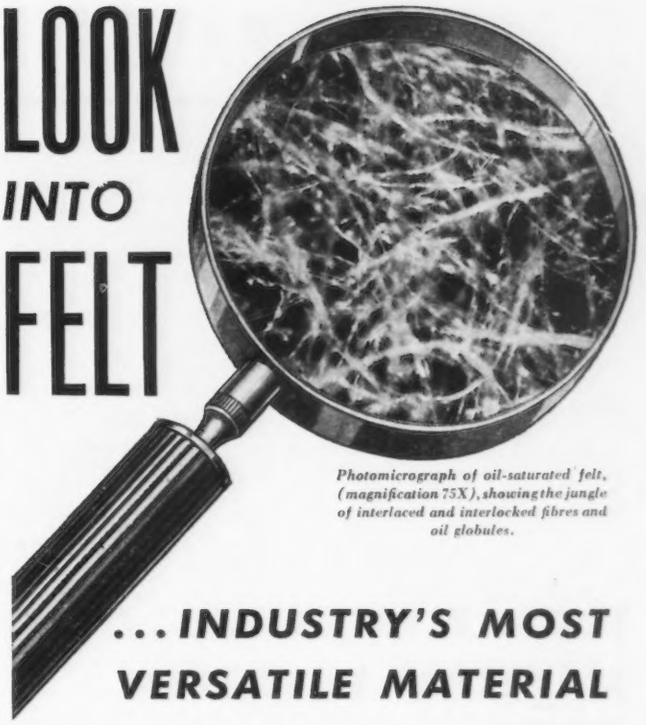
By Hughes-Keenan

Load-Handling Specialists Since 1904

LOOK INTO FELT



Photomicrograph of oil-saturated felt, (magnification 75X), showing the jungle of interlaced and interlocked fibres and oil globules.

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War conditions have brought a realization of the myriad advantages of felt. You may find it precisely what you need as an alternate for more critical materials. The properties of felt, among fabrics, are without equal. No material can equal the thermal and acoustical properties of Kapok Felt used in aircraft. Temperature may drop suddenly from 110° F. on the ground to 30° below zero F. in the ceiling, but the sound-absorbing and insulating properties of "K" Felt remain positive.

Felt will either feed or retain oil as it does at friction points in all types of machinery. Felt can strike a blow or completely cushion it. The general utility of felt is illustrated by its employment in conveyor tubes, embossing presses, dust excluding pads, weather-stripping, filters, respirators, vibration dampening, footwear, and clothing.

Felt ranges in thickness from .032" to 3.0"; in weight from 3 oz. to 65 lbs. per sq. yard; the usual width is 72". It can be as soft as a kitten's ear, or hard as maple.

We can make reasonably prompt shipments of Felts which meet all Government Specifications. Data Sheets such as #6, "Felt and Lubrication," #11, "Annular Designing and Dimensioning," and the S.A.E. Catalog, will be sent gladly on request.

American Felt Company

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General Offices: GLENVILLE, CONN.

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PRODUCERS OF FINEST QUALITY PARTS FOR OIL RETAINERS, WICKS, GREASE RETAINERS, DUST EXCLUDERS, GASKETS, PACKING FELTS, VIBRATION ISOLATING FELTS AND INSULATING FELTS

PRODUCTS INDEX

Cincinnati (Ohio) Shaper Co., The.
Cleveland Crane & Engineering Co., The, Steelweld Mchry. Div., 1115 East 283rd St., Wickliffe, Ohio.
Cleveland (Ohio) Punch & Shear Works Co., The.
Dreis & Krump Mfg. Co., Chicago, Ill.
Kane & Roach, Inc., Syracuse, N. Y.
Niagara Machine & Tool Works, Buffalo, N. Y.
O'Neil-Irwin Mfg. Co., 302-8th Ave. S., Minneapolis, Minn.
Yoder Co., The, Cleveland, Ohio.

Bending Machines — Hand, Band, Angle, & Pipe
American Pipe Bending Machine Co., Inc., 21 Pearl St., Boston, Mass.
Excelsior Tool & Mch. Co., E. St. Louis, Ill.

Benzol Recovery Plants
Koppers Co., Engineering & Construction Div., Pittsburgh.

Beryllium Copper
American Brass Co., The, Waterbury, Conn.
Ampco Metal, Inc., Milwaukee, Wis.

Billets—Alloy & Carbon Steel
Alan Wood Steel Co., Conshohocken, Pa
Andrews Steel Co., The, Newport, Ky.
Bethlehem (Pa.) Steel Company.
Copperweld Steel Co., Warren, Ohio.
Harrisburg (Pa.) Steel Corp.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa.
Pittsburgh (Pa.) Steel Co.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

Billets—Forging
Alan Wood Steel Co., Conshohocken, Pa.
Andrews Steel Co., The, Newport, Ky.
Harrisburg (Pa.) Steel Corp.
Pittsburgh (Pa.) Steel Co.
Republic Steel Corp., Cleveland, Ohio

Billets—Re-rolling Facilities
Nicetown Plate Washer Co., Inc. Philadelphia, Pa.

Bins—Assembly or Storage
Stackbin Corp., Providence, Rhode Island.

Blacking Salts, for Steel
Alrose Chemical Co., Cranston, Providence, R. I.
Heatbath Corp., Springfield, Mass.

Blast Air Conditioning
Pritchard, J. F., & Co., Kansas City, Mo.

Blast Cleaning Equipment
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Dreisbach Engineering Co., 45 Warburton Ave., Yonkers, N. Y.
Pangborn Corporation, Hagerstown, Md.
Ruemelin Mfg. Co., 3870 N. Palmer St., Milwaukee, Wis.

Blast Furnace Plants—Complete
McKee, Arthur G., & Co., Cleveland.
Pennsylvania Engineering Works, New Castle, Pa.

Blast Furnace Specialties
Bailey, Wm. M., Co., Pittsburgh, Pa.
McKee, Arthur G., & Co., Cleveland.
Pennsylvania Engineering Works, New Castle, Pa.

Blast Gates
Rockwell, W. S., Co., 50 Church St., N. Y. C.
Roots-Connersville Blower Corp., Connersville, Indiana.

Blocks—Chain
Ford Chain Block Div. American Chain & Cable Co., Inc., Philadelphia, Pa.

Blowers
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Blower Corp., 6000 Russell St., Detroit, Mich.
New York Blower Co., The, Chicago, Ill.
North American Mfg. Co., The, Cleveland, Ohio.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., The, Hartford, Conn.

Blowpipes—Soldering, Heating
American Gas Furnace Co., Elizabeth, N. J.
Weldit Acetylene Co., Detroit, Mich.

Blue Printing & White Print Machines & Paper
Ozalid Products Div. General Aniline & Film Corp., Johnson City, New York.
Pease, C. F., Company, The, 2695 W. Irving Pk. Road, Chicago, Ill.
Wickes Brothers, Saginaw, Mich.

Boilers
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

Bolt and Nut Machinery
Ajax Mfg. Co., The, Cleveland, Ohio.
Landis Machine Co., Waynesboro, Pa.
Oster Mfg. Co., The, Cleveland, Ohio.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

Bolt & Rivet Clippers
Helwig Mfg. Co., St. Paul, Minn.

Bolts and Nuts
American Screw Co., Providence, R. I.
Bethlehem (Pa.) Steel Company.
Clark Bros. Bolt Co., Millidale, Conn.
Cleveland (Ohio) Cap Screw Co., The.
Harper, H. M., Co., The, 2607 Fletcher St., Chicago, Ill.
Keystone Bolt & Nut Corp., 60-62 Murray St., N. Y. C.
Lamson & Sessions Co., The Cleveland.
Muench, H. E., P. O. Box 229, Stamford, Conn.
National Screw & Mfg. Co., Cleveland, Ohio.
Oliver Iron & Steel Corp., 10th & Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, Ohio.
Rhode Island Tool Co., Providence, R. I.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Triplex Screw Co., The, Cleveland, Ohio.

Bolts—Special
Bethlehem (Pa.) Steel Co.
Cleveland (Ohio) Cap Screw Co., The.
Lamson & Sessions Co., The, Cleveland.
Oliver Iron & Steel Corp., 10th & Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

Bolts—Stove
Cleveland (Ohio Cap Screw Co., The.
Lamson & Sessions Co., The, Cleveland.
Progressive Mfg. Co., Torrington, Conn.
Republic Steel Corp., Cleveland, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

Bolts—Stove, Recessed Head
American Screw Co., Providence, R. I.

Bolts—Track
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Lamson & Sessions Co., The, Cleveland, Ohio.
Oliver Iron & Steel Corp., 10th & Muriel Sts., Pittsburgh, Pa.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

Boring Bars
Bullard Co., The, Bridgeport, Conn.
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
Gairing Tool Co., The, Detroit.
Gisholt Machine Co., Madison, Wisconsin.

Boring, Drilling & Milling Machines—Horizontal
Atlantic Machinery Corp., 149 Broadway, New York City.
Giddings & Lewis Machine Tool Co., Fond du Lac, Wis.
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
Lucas Machine Tool Co., Cleveland.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.
Universal Boring Machine Co., Hudson, Mass.
Yoder Co., Cleveland, Ohio.

Boring & Drilling Machines—Vertical
Baker Brothers, Inc., Toledo, Ohio.
Bullard Co., The, Bridgeport, Conn.
Consolidated Machine Tool Corp., Rochester, New York.
Greenlee Bros., & Co., Rockford, Ill.

Boring & Facing Machines—Horizontal
Simmons Machine Tool Corp., Albany, N. Y.

Boring Machines—Diamond & Carbide Tools
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
Heald Machine Co., The, Worcester, Mass.
Sheffield Corp., The, Gage Div., Dayton, Ohio.

Boring Machines—Jig
Blank & Buxton Machinery Co., Jackson, Mich.
Cincinnati (Ohio) Bickford Tool Co., The
Fosdick Machine Tool Co., The, Cincinnati, Ohio.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

Boring & Turning Mills—Vertical
Bullard Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Planer Co.
Rogers Machine Works, Inc., Alfred, New York.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

Boxes—Shop
American Metal Works, Inc., 1516 Germantown Ave., Phila.
Factory Service Co., 4621 N. Twenty-first St., Milwaukee, Wis.
Stackbin Corp., Providence, Rhode Island.
Truscon Steel Co., Pressed Steel Div., Cleveland, Ohio.

Boxes—Stacking
American Metal Works, Inc., 1516 Germantown Ave., Phila.
Factory Service Co., 4621 N. Twenty-first St., Milwaukee, Wis.
Stackbin Corp., Providence, Rhode Island.
Truscon Steel Co., Pressed Steel Div., Cleveland, Ohio.

Brake Lining & Blocks—Asbestos
Johns-Manville Corp., 22 E. 40th St., N. Y. C.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.

Brakes—Electric
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.

Brakes—Magnetic
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

Brakes—Metal Forming
Birdsboro (Pa.) Steel Foundry & Machine Co.
Bryant Machinery & Engineering Co., Chicago.
Cincinnati (Ohio) Shaper Co., The.
Cleveland Crane & Engineering Co., The, Steelweld Mchry. Div., 1115 East 283rd St., Wickliffe, Ohio.
Dreis & Krump Mfg. Co., Chicago.
Ferracute Machine Co., Bridgeton, New Jersey.
O'Neil-Irwin Mfg. Co., 302-8th Ave. S., Minneapolis, Minn.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.

Brazing Alloys
Handy & Harman, 82 Fulton St., New York City.

Brick—Insulating
Armstrong Cork Co., 978 Concord St., Lancaster, Pa.
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

Broaches
Colonial Broach Co., Detroit.
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
LaPointe Machine Tool Co., The, Hudson, Mass.
National Broach & Machine Co., Detroit, Michigan.

Broaching Machines
Bullard Co., The, Bridgeport, Conn.
Cincinnati (Ohio) Milling Mch. Co., The.
Colonial Broach Co., Detroit.
LaPointe Machine Tool Co., The, Hudson, Mass.
Lucas Machine Tool Co., Cleveland.
Wickes Brothers, Saginaw, Mich.

Bronze—Phosphor
American Brass Co., The, Waterbury, Conn.
Bridgeport (Conn.) Brass Co.
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Seymour (Conn.) Mfg. Co., The.
Western Cartridge Co., Brass Mill Div., East Alton, Ill.

Brushes—Industrial
Osborn Manufacturing Co., The, Cleveland, Ohio.

Buckets—Clamshell, Grab, Dragline
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Cullen-Friestedt Co., 1303 S. Kilbourn Ave., Chicago.
Hayward Co., The, 50 Church St., N. Y. C.
Industrial Brownhoist Corp., Bay City, Mich.
Wellman Engineering Co., The, Cleveland.

Buffers—Portable
Black & Decker Mfg. Co., The, Towson, Md.
Rotor Tool Co., The, Cleveland, Ohio.

Buildings & Bridges—Steel
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
American Rolling Mill Co., The, Middletown, Ohio.
Belmont Iron Works, Philadelphia.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Iron & Steel Products, Inc., Chicago.

Bulldozers
Ajax Mfg. Co., The, Cleveland, Ohio.
Beatty Machine & Mfg. Co., 936-150th St., Hammond, Ind.
Cleveland Crane & Engineering Co., The Steelweld Mchry. Div., 1115 East 283rd St., Wickliffe, Ohio.

Burners—Oil or Gas
American Gas Furnace Co., Elizabeth, N. J.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Dempsey Industrial Furnace Corp., Springfield, Mass.
Despatch Oven Co., Minneapolis, Minn.
Hauck Mfg. Co., 128 Tenth St., Brooklyn, N. Y.
North American Mfg. Co., The, Cleveland, Ohio.
R-S Products Corp., Philadelphia, Pa.
Stewart Furnace Div, Chicago Flexible Shaft Co., Chicago, Ill.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, Ohio.
Wean Engineering Co., Inc., The, Warren, Ohio.
Wilson Lee Engineering Co., Cleveland, Ohio.

Burnishing Machines—Gear
Fellows Gear Shaper Co., The, Springfield, Vt.
Sheffield Corp., The, Gage Div., Dayton, Ohio.

Burring Machines
National Broach & Machine Co., Detroit, Michigan.
Sheffield Corp., The, Gage Div., Dayton, Ohio.

Bushings—Bronze
Ampco Metal, Inc., Milwaukee, Wis.
Bunting Brass & Bronze Co., The, Toledo, O.
Johnson Bronze Co., 505 So. Mill St., New Castle, Pa.
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.
Shenango-Penn Mold Co., Dover, Ohio.

Bushings—Drill Jig
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

Bushings—Oilless
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Rhoades, R. W., Metaline Co., Inc., Long Island City, N. Y.

By-Product Plants
Koppers Co., Engineering & Construction Div., Pittsburgh.

Cable—Electric
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland, Ohio.
General Electric Co., Schenectady, N. Y.
Lincoln Electric Co., The, Cleveland.
Roebling's, John A., Sons Co., Trenton, N. J.

Calcium Metal & Alloys
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

Cams
Hartford (Conn.) Special Machinery Co., The.

Car Movers—Electric, Gasoline & Diesel
Silent Hoist Winch & Crane Co., 851-63rd St., Brooklyn, N. Y.

Carbide
Air Reduction, 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

Carbon—Brick & Powder
National Carbon Co., Inc., Carbon Sales Div., Cleveland, Ohio.

Carburizing Boxes
American Manganese Steel Div. of The American Brake Shoe & Foundry Co., Chicago Heights, Ill.
Electro Alloys Co., The, Elyria, Ohio.

Cars—Dump
Pressed Steel Car Co., Inc., Koppel Div., Pittsburgh, Pa.

Cars—Industrial and Mining
Bartlett, C. O. and Snow Co., The, Cleveland, Ohio.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Pressed Steel Car Co., Inc., Koppel Div., Pittsburgh, Pa.

Cars—Ladle, Cinder & Slag
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Pennsylvania Engineering Works, New Castle, Pa.
Pollock, Wm. B., Co., The, Youngstown, Ohio.
Pressed Steel Car Co., Inc., Koppel Div., Pittsburgh, Pa.

Cars—Passenger, Railway
Budd, Edward G., Mfg. Co., Philadelphia, Pa.
Pressed Steel Car Co., Inc., Pittsburgh, Pa.

Cars—Railway
Iron & Steel Products, Inc., Chicago.
Pressed Steel Car Co., Inc., Pittsburgh, Pa.

Cartons—Paperboard
Sutherland Paper Co., Kalamazoo, Mich.

Casters
Darnell Corp., Ltd., Long Beach, Calif.

Castings—Acid or Heat Resisting
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Manganese Steel Div. of The American Brake Shoe & Foundry Co., Chicago Heights, Ill.

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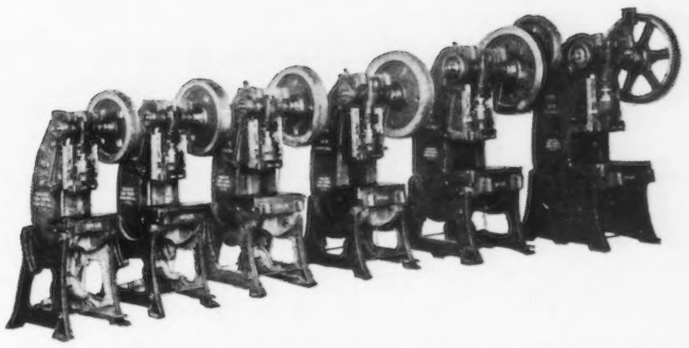

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DIMENSIONS	1R	2R	3R	4R	5R	5½R	6R	7R	8R
Diameter of crankshaft at bearings and crankpin	1⅞-2¾"	2¼-3½"	2½-3¾"	3-4½"	3½-5¼"	4-5¼"	4-6"	4½-6¾"	5-7½"
Standard stroke of slide	2"	2"	2"	3"	3"	3"	3"	4"	4"
Maximum stroke of slide	4"	5"	6"	6"	7"	7"	8"	8"	10"
Area top of bolster, F to B by R to L	9½x16½"	12x19"	13x22"	14x26"	18x32"	18x32"	21x34"	24x41"	27x45"
Approximate weight Fly Wheel Press	1275	1890	2900	4500	7600	7700	9700	18500	24000
Approximate weight Single Geared Press	1350	2100	3400	5100	8750	8900	10700	20000	25600
Tons pressure (rated)	14	20	26	37	50	56	65	85	100

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PITTSBURGH, PENNA.
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BOSTON, MASS.

PRODUCTS INDEX

Ampco Metal, Inc., Milwaukee, Wis.
Cramp Brass & Iron Foundries Div. of The Baldwin Locomotive Wks., Philadelphia.
Electro Alloys Co., The, Elyria, Ohio.
Hoskins Mfg. Co., Detroit, Mich.
Lebanon (Pa.) Steel Foundry.
Meehanite Research Institute, Pittsburgh, Pa.
Michiana Products Corp., Michigan City, Ind.
Midvale Co., The, Nicetown, Phila., Pa.
Ohio Steel Foundry Co., Lima, Ohio.
Wall-Colmonoy Corp., Detroit, Mich.

Castings—Alloy Steel
Advance Foundry Co., The, Dayton, Ohio.
American Manganese Steel Div. of The American Brake Shoe & Foundry Co., Chicago Heights, Ill.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Dodge Steel Co., Philadelphia, Pa.
Electro Alloys Co., The, Elyria, Ohio.
Hartford (Conn.) Electric Steel Corp.
Lebanon (Pa.) Steel Foundry.
Mackintosh-Hemphill Co., Pittsburgh.
Michiana Products Corp., Michigan City, Ind.
National Erie Corp., Erie, Pa.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Unitcast Corp., Toledo, Ohio.

Castings—Brass, Bronze, Copper or Aluminum
Aluminum Co. of America, Pittsburgh.
Boose Aluminum Foundry Co., Reamstown, Pa.
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Cadman, A. W., Mfg. Co., Pittsburgh.
Cramp Brass & Iron Foundries Div. of The Baldwin Locomotive Wks., Philadelphia.
Hammond Brass Works, 1644 Summer St., Hammond, Ind.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
National Bearing Metals Corp., Pittsburgh.
Safe Padlock & Hardware Co., The, Lancaster, Pa.
Shenango-Penn Mold Co., Dover, Ohio.
Spencer's, I. S. Sons, Inc., Guilford, Ct.
United States Bronze Sign Co., Inc., 570 Broadway, New York City.

Castings—Die
Aluminum Co. of America, Pittsburgh.
Mount Vernon Die Casting Corp., Mount Vernon, New York.
Norlipp Co., The, Chicago, Ill.
Titan Metal Mfg. Co., Bellefonte, Pa.

Castings—Electric Steel
Continental Roll & Steel Fdry. Co., East Chicago, Ind.
Crucible Steel Castings Co., Lansdowne, Pa.
Dodge Steel Co., Philadelphia, Pa.
Lebanon (Pa.) Steel Foundry.
National Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, Ohio.
Unitcast Corp., Toledo, Ohio.

Castings—Gray Iron and Semi-Steel
Advance Foundry Co., The, Dayton, Ohio.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
American Engineering Co., Philadelphia.
Commercial Casting Div. Ohio Stove Co., Portsmouth, Ohio.
Cox & Sons Co., The, Bridgeton, N. J.
Cramp Brass & Iron Foundries Div. of The Baldwin Locomotive Wks., Philadelphia.
Eaton Mfg. Co., Fdry. Div., Detroit, Mich.
Etna Machine Co., The, Toledo, Ohio.
Judd, H. L., Co., Inc., 87 Chambers St., New York City.
King Foundries, Inc., North Wales, Pa.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Lobdell Co., Wilmington, Del.
National Roll & Fdry. Co., Avonmore, Pa.
Ohio Stove Co., Commercial Castings Div., Portsmouth, Ohio.
Spencer's, I. S. Sons, Inc., Guilford, Ct.
Steel Prods. Sales Corp., 52 Vanderbilt Ave., N. Y. C.

Castings—High Test & Alloy Iron
Cramp Brass & Iron Foundries Div. of The Baldwin Locomotive Wks., Philadelphia.
Meehanite Research Institute, Pittsburgh, Pa.
Michiana Products Corp., Michigan City, Ind.

Castings—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

Castings—Malleable
Fort Pitt Malleable Iron Co., Pittsburgh, Pa.
Lake City Malleable Co., The, 5100 Lakeside Ave., Cleveland.
Northern Malleable Iron Co., St. Paul, Minn.
Peoria (Ill.) Malleable Castings Co.
Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Michigan.

Castings—Manganese Steel
American Manganese Steel Div. of The American Brake Shoe & Foundry Co., Chicago Heights, Ill.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

Castings—Meehanite Metal
Meehanite Research Institute, Pittsburgh, Pa.

Castings—Monel & Nickel
Cramp Brass & Iron Foundries Div. of The Baldwin Locomotive Wks., Philadelphia.

Castings—Permanent Mold Iron
Eaton Mfg. Co., Fdry. Div., Detroit, Mich.

Castings—Phosphor Bronze
Bunting Brass & Bronze Co., The, Toledo, Ohio.
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.

Castings—Steel
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, Ohio.
Bethlehem (Pa.) Steel Company.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Continental Roll & Steel Fdry. Co., East Chicago, Ind.
Crucible Steel Castings, Lansdowne, Pa.
Dodge Steel Co., Philadelphia, Pa.
Erie (Pa.) Forge Co.
Hartford (Conn.) Electric Steel Corp.
Lebanon (Pa.) Steel Foundry.
Mackintosh-Hemphill Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
Michiana Products Corp., Michigan City, Ind.
National Erie Corp., Erie, Pa.
Ohio Steel Foundry Co., Lima, Ohio.
Saginaw Malleable Iron Div. General Motors Corp., Saginaw, Mich.
Standard Steel Wks. Div. The Baldwin Locomotive Works, Phila., Pa.
Strong Steel Foundry Co., Buffalo, N. Y.
Unitcast Corp., Toledo, Ohio.

Castings—Wear Resisting
Lebanon (Pa.) Steel Foundry.
Meehanite Research Institute, Pittsburgh, Pa.
Saginaw Malleable Iron Div., General Motors Corp., Saginaw, Michigan.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Wall-Colmonoy Corp., Detroit, Mich.

Cement—Acid-Proof
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Cement—Refractory
Babcock & Wilcox Co., The, 85 Liberty St., New York City.
Holden, A. F., Co., The, New Haven, Conn.
Johns-Manville Corp., 22 East 40th St., New York City.

Centering Machines
Hendey Machine Co., Torrington, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
Sundstrand Machine Tool Co., Rockford, Ill.

Centers—Lathe & Grinder, Carbide-tipped
McKenna Metals Co., Latrobe, Pa.

Chains—Conveyor & Elevator
American Manganese Steel Div. of The American Brake Shoe & Foundry Co., Chicago Heights, Ill.
Bartlett, C. O., and Snow Co., The, Cleveland, Ohio.
Link-Belt Co., 220 So. Belmont Ave. Indianapolis, Ind.

Chains—Power Transmission
Link-Belt Co., 220 So. Belmont Ave., Indianapolis, Ind.
Morse Chain Co., Ithaca, N. Y.
Pyott Foundry & Machine Co., Chicago, Ill.
Whitney Chain & Mfg. Co., Hartford, Ct.

Chains—Welded
American Chain & Cable Co., Inc., York, Pa.

Chamfering Machines (Gear)
Cross Gear & Machine Co., Detroit, Mich.
Sheffield Corp., The, Gage Div., Dayton, Ohio.

Channels—See Angles

Checks—Metal
Cunningham, M. E., Co., Pittsburgh, Pa.
Noble & Westbrook Mfg. Co., The, E. Hartford, Conn.

Chemicals—Industrial
Koppers Co., Tar & Chemical Div., Pittsburgh, Pa.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Chilling Equipment—Industrial
Motor Products Corp., Deepfreeze Div., 2328 Davis St., North Chicago, Ill.

Chisels
Cleveland (Ohio) Punch & Shear Works Co., The.
Cleveland Steel Tool Co., The, 660 East 82nd St., Cleveland, Ohio.

Chromium Metal & Alloys
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Chucking Machines
Baird Mch. Co., The, Bridgeport, Conn.
Cleveland (Ohio) Automatic Machine Co., The.
Gisholt Machine Co., Madison, Wis.
Goss & DeLeeuw Machine Co., New Britain, Conn.
Jones & Lamson Machine Co., Springfield, Vt.
National Acme Co., The, Cleveland.
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.
Potter & Johnston Machine Co., Pawtucket, R. I.

Chucks—Air Operated
Logansport (Ind.) Machine, Inc.
Tomkins-Johnson Co., The, Jackson, Mich.

Chucks—Drill
Cleveland (Ohio) Twist Drill Co., The.
Cushman Chuck Co., Hartford, Conn.
Millers Falls Co., Greenfield, Mass.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
North Bros. Mfg. Co., Philadelphia, Pa.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio.

Chucks—Drill, Quick Change
Apex Machine & Tool Co., The, Dayton, Ohio.

Chucks—Lathe
Cushman Chuck Co., Hartford, Conn.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.

Chucks—Magnetic
Brown & Sharpe Mfg. Co., Providence, R. I.
Heald Machine Co., The, Worcester, Mass.
Taft-Pierce Mfg. Co., The, Woonsocket, R. I.

Chucks—Tapping
Apex Machine & Tool Co., The, Dayton, Ohio.

Clay Guns
Bailey, Wm. M., Co., Pittsburgh, Pa.

Cleaners—Metal
American Chemical Paint Co., Ambler, Pa.
Ford, J. B., Sales Co., The, Wyandotte, Mich.
Holden, A. F., Co., The, New Haven, Conn.
Houghton, E. F., & Co., Philadelphia, Pa.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., 46 South Ave., Garwood, N. J.
Oakite Products, Inc., 22 Thames St., New York City.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Cleaners, Vacuum—Industrial
Spencer Turbine Co., The, Hartford, Conn.

Cleaners—Window
Stardust Manufacturing Co., Memphis, Tenn.

Cleaning Equipment (Metal)—Electro-Chemical
Bullard-Dunn Div., The Bullard Co., Bridgeport, Conn.
Meaker Co., The, Chicago, Ill.

Clothing—Safety
Don-Ed Fabrics, Inc., 989 Sixth Ave., N. Y. C.
Mine Safety Appliance Co., Pittsburgh, Pa.

Clothing-Skin Infection Guards
Don-Ed Fabrics, Inc., 989 Sixth Ave., N. Y. C.

Clutches
Dodge Mfg. Corp., Mishawaka, Ind.
Fairbanks, Morse & Co., Chicago.
Falls Clutch & Mchry. Co., The, Cuyahoga Falls, Ohio.
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.
Hill Acme Co., The, Cleveland, Ohio.
Hilliard Corp., The, Elmira, New York.
Medart Co., The, St. Louis, Mo.
Morse Chain Co., Ithaca, N. Y.
Twin Disc Clutch Co., Racine, Wis.

Clutches—Magnetic
Cutler-Hammer, Inc., Milwaukee.
Dings Magnetic Separator Co., 517 E. Smith St., Milwaukee.
Stearns Magnetic Mfg. Co., 635 So. 28th St., Milwaukee.

Coal
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Koppers Coal Co., The, Pittsburgh.
Pickands Mather & Co., Cleveland, Ohio.

Coal, Ore & Ash Handling Machinery
Alliance (Ohio) Machine Co., The.
Alvey-Ferguson Co., The, 711 Disney St., Cincinnati, Ohio.
Bartlett, C. O., and Snow Co., The, Cleveland, Ohio.
Link-Belt Co., 300 West Pershing Road, Chicago, Ill.

Coiling Machinery—Wire Spring
Torrington (Conn.) Mfg. Co., The.

Coke—Metallurgical
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Koppers Co., Gas & Coke Div., 60 East 42nd St., New York City.
Pickands Mather & Co., Cleveland, Ohio.

Coke Oven Machinery
Koppers Co., Engineering & Construction Div., Pittsburgh.

Cold Roll Forming Machines
Kane & Roach, Inc., Syracuse, N. Y.
McKay Machine Co., The, Youngstown Ohio.
Yoder Co., The, Cleveland, Ohio.

Collets
Apex Machine & Tool Co., The, Dayton, Ohio.
Cullman Wheel Co., 1330 Altgeld St., Chicago, Ill.
Precision Collet Co., 265 Canal St., N. Y. C.

Columbium
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

Combustion Controls
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.
Morgan Construction Co., Worcester, Mass.
North American Mfg. Co., The, Cleveland, Ohio.

Compounds—Drawing and Cutting
Gray-Mills Co., Chicago, Ill.
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Houghton, E. F., & Co., Philadelphia, Pa.
Magnus Chemical Co., 46 South Ave., Garwood, N. J.
Oakite Products, Inc., 22 Thames St., N. Y. C.
Standard Oil Co. (Indiana), Chicago.
Stuart, D. A. Oil Co., Ltd., Chicago, Ill.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

Compressors—Air
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Curtis Pneumatic Mchry. Div. of Curtis Mfg. Co., 1948 Kienlen Ave., St. Louis, Mo.
DeVilbiss Co., The, Toledo, Ohio.
Fairbanks, Morse & Co., Chicago.
Roots-Connersville Blower Corp., Connersville, Ind.
Spencer Turbine Co., The, Hartford, Conn.

Condensers—Surface & Jet
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Contour Machining Attachment
Detroit (Mich.), Universal Duplicator Co., 214 St. Aubin St.

Controllers—Electric
Adam, Frank, Electric Co., St. Louis, Mo.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bull Dog Electric Products Co., Detroit, Mich.
Cutler-Hammer, Inc., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.
General Electric Co., Schenectady, N. Y.

Converters—Steel Melting
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Conveying and Elevating Machinery
Alvey-Ferguson Co., The, 711 Disney St., Cincinnati, Ohio.
Bartlett, C. O., and Snow Co., The, Cleveland, Ohio.
Link-Belt Co., 300 West Pershing Road, Chicago, Ill
Logan Co., Inc., Louisville, Ky.
Mathews Conveyor Co., Ellwood City, Pa.

Conveyor Worms
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.

Conveyors—Gravity
Alvey-Ferguson Co., The, 711 Disney St., Cincinnati, Ohio.
Logan Co., Inc., Louisville, Ky.
Mathews Conveyor Co., Ellwood City, Pa.

Conveyors—Monorail
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., 1115 East 283rd St., Wickliffe, Ohio.

Core Oil
Houghton, E. F., & Co., Philadelphia, Pa.
Sun Oil Co., Philadelphia.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

Corrugating Machines
Streine Tool & Mfg. Co., New Bremen, Ohio.

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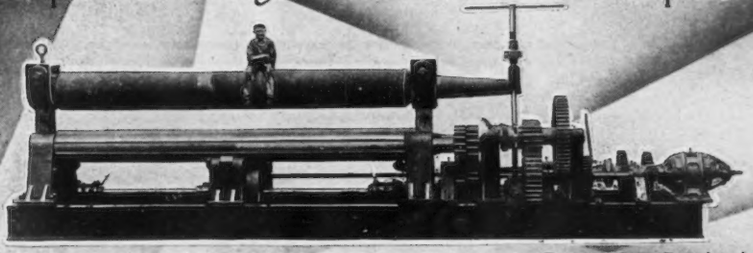
Capacities – Lightest sheet to heaviest plate



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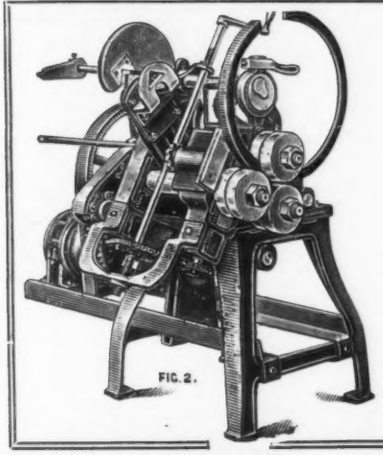
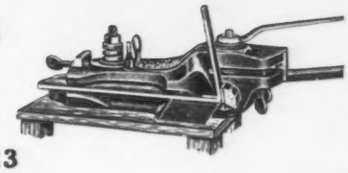


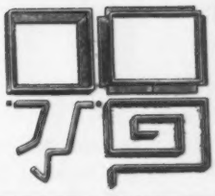
FIG. 2.

No. 14—EXCELSIOR—No. 13 BENDING MACHINES

Angle, Channel, Flat, Round, or Square Iron



No. 14	No. 13
Circular Bent Angles	Square Bent Sizes
Capacity 2" x ¼"	1¼" x ¼" Capacity
True Circles, all the	2½" x 3/16" Capacity
Rolls Direct Driven	4" x ⅛" Capacity



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Cotter Pins
American Chain & Cable Co., Inc., York, Pa.
Hindley Mfg. Co., Valley Falls, R. I.
Hubbard, M. D., Spring Co., 330 Central Ave., Pontiac, Mich.
Lamson & Sessions Co., The, Cleveland.
Western Wire Prods. Co., St. Louis, Mo.

Counterbores
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
Cleveland (Ohio) Twist Drill Co., The.
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
Gairing Tool Co., The, Detroit.
Genesee Tool Co., Fenton, Mich.
Morse Twist Drill & Mch. Co., New Bedford, Mass.

Couplings—Cut-Off Friction
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.

Couplings—Flexible & Shaft
Hill Acme Co., The, Cleveland, Ohio.
Hilliard Corp., The, Elmira, New York.
James, D. O., Mfg. Corp., 1120 W. Monroe St., Chicago, Ill.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Lovejoy Flexible Coupling Co., 4979 Lake St., Chicago, Ill.
Medart Co., The, St. Louis, Mo.
Morse Chain Co., Ithaca, N. Y.
Poole Foundry & Mch. Co., Baltimore, Md.
Twin Disc Clutch Co., Racine, Wis.

Couplings—Pipe
Champion Machine & Forging Co., The, Cleveland, Ohio.
Harrisburg (Pa.) Steel Corp.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.

Cranes—Crawling
Cullen-Friestedt Co., 1303 S. Kilbourn Ave., Chicago.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Hughes-Keenan Co., The, Mansfield, Ohio.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., The, Bucyrus, Ohio.
Osgood Co., The, Marion, Ohio.

Cranes—Electric Traveling
Alliance (Ohio) Machine Co., The.
Armel, James P., Pittsburgh.
Cleveland Crane & Engineering Co., 1115 East 283rd St., Wickliffe, Ohio.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., 1115 East 283rd St., Wickliffe, Ohio.
Conco Engineering Works Div. of H. D. Conkey & Co., Mendota, Ill.
Curtis Pneumatic Mchry. Div. of Curtis Mfg. Co., 1948 Kienlen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Morgan Engineering Co., The, Alliance, O.
Northern Engineering Works, Detroit, Mich.
Payne, N. B., 105 W. 55th St., N. Y. C.
Reading (Pa.) Chain & Block Corp.
Robbins & Myers, Inc., Springfield, O.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Cranes—Gantry
Alliance (Ohio) Machine Co., The.
Cleveland Crane & Engineering Co., 1115 East 283rd St., Wickliffe, Ohio.
Dravo Corp., Machinery Div., Pittsburgh, Pa.
Euclid Crane & Hoist Co., The, Euclid, Ohio.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Morgan Engineering Co., The, Alliance, O.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Cranes—Hand
American Monorail Co., The, Cleveland.
Cleveland Crane & Engineering Co., 1115 East 283rd St., Wickliffe, Ohio.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., 1115 East 283rd St., Wickliffe, Ohio.
Conco Engineering Works Div. of H. D. Conkey & Co., Mendota, Ill.
Curtis Pneumatic Mchry. Div. of Curtis Mfg. Co., 1948 Kienlen Ave., St. Louis, Mo.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Northern Engineering Works, Detroit.
Reading (Pa.) Chain & Block Corp.
Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Cranes—Jib
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1115 East 283rd St., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Pennsylvania Engineering Works, New Castle, Pa.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Cranes—Locomotive
Cullen-Friestedt Co., 1303 S. Kilbourn Ave., Chicago.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Industrial Brownhoist Corp., Bay City, Mich.
Ohio Locomotive Crane Co., The, Bucyrus, O.
Silent Hoist Winch & Crane Co., 851-63rd St., Brooklyn, N. Y.

Cranes—Monorail
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., 1115 East 283rd St., Wickliffe, Ohio.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Reading (Pa.) Chain & Block Corp.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

Cranes—Portable
Hill Acme Co., The, Canton Div., 6400 Breakwater Ave., Cleveland, Ohio.

Cranes—Tractor Type, Gasoline & Diesel
Hughes-Keenan Co., The, Mansfield, Ohio.
Silent Hoist Winch & Crane Co., 851-63rd St., Brooklyn, N. Y.

Cranes—Trucks Mounted
Osgood Co., The, Marion, Ohio.

Crankshafts
Bay City Forge Co., Erie, Pa.
Kropp Forge Co., Chicago, Ill.
Midvale Co., The, Nicetown, Phila., Pa.
Transue & Williams Steel Forging Corp., Alliance, Ohio.

Crayons—Hot & Cold Marking
American Crayon Company, The, Sandusky, Ohio.

Crushers
American Pulverizer Co., 1439 Macklind Ave., St. Louis, Mo.

Cupola Charging Equipment
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Cupolas
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Cutters & Burrs—Diemakers'
Chicago (Ill.) Wheel & Mfg. Co., 1101 W. Monroe St.

Cutters—Die Sinking
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Tomkins-Johnson Co., The, Jackson, Mich.

Cutters—Keyseating
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

Cutters—Milling
Brown & Sharpe Mfg. Co., Providence, R. I.
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Michigan.
Cleveland (Ohio) Twist Drill Co., The.
Gairing Tool Co., The, Detroit.
Genesee Tool Co., Fenton, Mich.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio.
Union Twist Drill Co., Athol, Mass.

Cutters—Thread Milling
Detroit (Mich.) Tap & Tool Co.

Cutting - Compounds — See Compounds

Cutting-Off Machines
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Bardons & Oliver, Inc., Cleveland.
Cox & Sons Co., The, Bridgeton, N. J.
Landis Mch. Co., Waynesboro, Pa.
Peerless Machine Co., 1613 Junction Ave., Racine, Wis.

Cutting-Off Machines—Abrasive
Campbell, Andrew C., Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.
DeSanno, A. P., & Son, Inc., Phoenixville, Pa.
Tabor Mfg. Co., The, Philadelphia, Pa.

Cutting-Off Machines—Cold Saw
Espen-Lucas Mch. Wks., Philadelphia.

Cutting-Off Wheels
Carborundum Co., The Niagara Falls, N. Y.
DeSanno, A. P., & Son, Inc., Phoenixville, Pa.

Cylinders—Air & Hydraulic
Hannifin Mfg. Co., Chicago, Ill.
Logansport (Ind.) Machine, Inc.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.
Tomkins-Johnson Co., The, Jackson, Mich.

Cylinders—Seamless
Harrisburg (Pa.) Steel Corp.
Midvale Co., The, Nicetown, Phila., Pa.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

Degreasing Compounds
Ford, J. B., Sales Co., The, Wyandotte, Mich.
Magnus Chemical Co., 46 South Ave., Garwood, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.
Phillips Mfg. Co., Chicago, Ill.

Degreasing Machines—Solvent
Phillips Mfg. Co., Chicago, Ill.

Deoxidizers
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Diamonds and Diamond Tools
Diamond Tool Co., Chicago, Ill.
Koebel Diamond Tool Co., 9349 Grinnell Ave., Detroit, Mich.
Smit, J. K., & Sons, Inc., 157 Chambers St., New York City.

Dictating Machines
Dictaphone Corp., 420 Lexington Ave., New York City.

Die Blocks—Drop Hammer
Heppenstall Co., Pittsburgh.
Kropp Forge Co., Chicago, Ill.

Die Casting Machines
Reed-Prentice Corp., Worcester, Mass.

Die—Hard Carbide Inserts
McKenna Metals Co., Latrobe, Pa.

Die Sinking Machines
Cincinnati (Ohio) Milling Mch. Co., The.
Pratt & Whitney Div., Niles-Bement-Pond Co., West Hartford, Conn.

Dies—Cast Tool Steel
Advance Foundry Co., The, Dayton, Ohio.

Dies—Pipe Threading
Greenfield (Mass.) Tap & Die Corp.
Landis Mch., Co., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., The, Cleveland.

Dies—Resistance Welding
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

Dies—Sheet Metal Working
Budd, Edward G., Mfg. Co., Philadelphia, Pa.
Niagara Machine & Tool Works, Buffalo, New York.
O'Neil-Irwin Mfg. Co., 302—8th Ave. S., Minneapolis, Minn.
Sheffield Corp., The, Gage Div., Dayton, Ohio.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.
Vulcan Tool Co., Dayton, Ohio.
Worcester (Mass.) Stamped Metal Co., 6 Hunt St.

Dies—Steel Marking
Cunningham, M. E., Co., Pittsburgh, Pa.
Matthews, Jas. H. & Co., Pittsburgh, Pa.
Noble & Westbrook Mfg. Co., The, E. Hartford, Conn.

Dies—Threading
Eastern Mach. Screw Corp., New Haven, Ct.
Geometric Tool Co., The, New Haven, Conn.
Greenfield (Mass.) Tap & Die Corp.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., The, Cleveland.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio.

Dies—Threading, Opening
Eastern Mach. Screw Corp., New Haven, Ct.
Geometric Tool Co., The, New Haven, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
Landis Mch. Co., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit, Mich.
National Acme Co., The, Cleveland, Ohio.
Rickert-Shafer Co., The, Erie, Pa.

Dies—Wire Drawing
Carboloy Co., Inc., 11153 E. 8-Mile Road, Detroit, Michigan.
Vascoloy-Ramet Corp., North Chicago, Ill.

Dolomite—Flux & Refractories
Basic Refractories, Inc., Cleveland, Ohio.

Doors & Shutters—Steel
Kinnear Mfg. Co., The, Columbus, Ohio
Mahon, R. C., Co., Detroit, Mich.

Drafting Room Furniture
Pease, C. F., Company, The, 2695 W. Irving Pk. Road, Chicago, Ill.

Dressers—Grinding Wheel
Carboloy Co., Inc., 11153 E. 8-Mile Rd., Detroit, Mich.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio.

Drilling Machines—Bench
Leland-Gifford Co., Worcester, Mass.
Walker-Turner Co., Inc., Plainfield, N. J.

Drilling Machines—Continuous
Davis & Thompson Co., Milwaukee, Wis.

Drilling Machines—Multiple Spindle
Baker Brothers, Inc., Toledo, Ohio.
Baush Machine Tool Co., Springfield, Mass.
Cincinnati (Ohio) Bickford Tool Co., The.
Greenlee Bros. & Co., Rockford, Ill.
Henry & Wright Mfg. Co., The, Hartford, Conn.
Kingsbury Machine Tool Corp., Keane, N. H.
Walker-Turner Co., Inc., Plainfield, N. J.

Drilling Machines—Portable Electric
Black & Decker Mfg. Co., The, Towson, Md.
Millers Falls Co., Greenfield, Mass.
Rotor Tool Co., The, Cleveland, Ohio.
Schauer Machine Co., 2069 Reading Road, Cincinnati, Ohio.
Stanley Electric Tool Div., The, Stanley Works, New Britain, Conn.

Drilling Machines — Portable Pneumatic
Helwig Mfg. Co., St. Paul, Minn.
Rotor Tool Co., The, Cleveland, Ohio.
Warner & Swasey Co., The, Cleveland.

Drilling Machines—Radial
Bryant Machinery & Engineering Co., Chicago.
Cincinnati (Ohio) Bickford Tool Co., The.
Cleveland (Ohio) Punch & Shear Works Co., The.
Fosdick Machine Tool Co., The, Cincinnati, Ohio.

Drilling Machines—Sensitive
Buffalo (N. Y.) Forge Co., 492 Broadway.
Fosdick Machine Tool Co., The, Cincinnati, Ohio.
Leland-Gifford Co., Worcester, Mass.
Walker-Turner Co., Inc., Plainfield, N. J.

Drilling Machines—Vertical
Baker Brothers, Inc., Toledo, Ohio.
Bryant Machinery & Engineering Co., Chicago.
Cincinnati (Ohio) Bickford Tool Co., The.
Cleereman Mch. Tool Co., Green Bay, Wis.
Fosdick Machine Tool Co., The, Cincinnati, Ohio.
Kingsbury Machine Tool Corp., Keane, N. H.
Walker-Turner Co., Inc., Plainfield, N. J.

Drilling Machines—Wall Radial
Cleveland (Ohio) Punch & Shear Works Co., The.

Drill Heads—Multiple
Kingsbury Machine Tool Corp., Keane, N. H.

Drills—Hand & Breast
North Bros. Mfg. Co., Philadelphia, Pa.

Drills—For Hard Steel
Black Drill Co., Cleveland, Ohio.

Drives—Multiple V-Belt
Allis-Chalmers Mfg. Co., Milwaukee.
Multiple V-Belt Drive Assn., Chicago, Ill.
Pyott Foundry & Machine Co., Chicago, Ill.

Dust Collectors
Abrasive Machine Tool Co., East Providence, R. I.
American Blower Corp., 6000 Russell St., Detroit, Mich.
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Kirk & Blum Mfg. Co., The, Cincinnati, Ohio.

PRODUCTS INDEX

Mahon, R. C., Co., Detroit, Mich.
Pangborn Corporation, Hagerstown, Md.
Ruemelin Mfg. Co., 3870 N. Palmer St., Milwaukee, Wisconsin.
Torit Mfg. Co., 287 Walnut St., St. Paul, Minn.
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Economizers
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

Electrical Distribution Systems
Bull Dog Electric Products Co., Detroit, Mich.

Electrical Equipment
Allis-Chalmers Mfg. Co., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland, Ohio.
Fairbanks, Morse & Co., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., E. Pgh., Pa.

Electrodes—Welding
Air Reduction, 60 East 42nd St., New York City.
Alloy Rods Co., York, Pa.
Arcos Corp., Philadelphia, Pa.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Lincoln Electric Co., The, Cleveland.
Mallory, P. R., & Co., Inc., Indianapolis, Ind.
National Cylinder Gas Co., Chicago, Ill.

Electroplating
Brunell, A. A., Electroplating Corp., 370 Park Ave., Worcester, Mass.
Judd, H. L., Co., Inc., 87 Chambers St., New York City.
Safe Padlock & Hardware Co., The, Lancaster, Pa.
Meaker Co., The, Chicago, Ill.
Siefen, J. J., Co., Detroit, Mich.
Udylite Corp., The, Detroit, Mich.
United Chromium Incorporated, 51 East 42nd St., N. Y. C.
United Platers, Inc., 989 Madison Ave., Detroit, Mich.

Enamels
New Wrinkle, Inc., Dayton, Ohio.

Engineering—Production
Trundle Engineering Co., Cleveland, Ohio.

Engineers & Contractors
Loftus Engineering Co., Pittsburgh, Pa.
McKee, Arthur G., & Co., Cleveland, Ohio.
Pennsylvania Engineering Works, New Castle, Pa.
Pollock, Wm. B., Co., The, Youngstown, Ohio.

Engineers—Consulting and Industrial
Boynton, A. J., & Co., Chicago, Ill.
Koppers Co., Engineering & Construction Div., Pittsburgh.
Pioneer Engineering & Mfg. Co., Detroit, Mich.
Van Dorn Iron Works Co., The, Cleveland, Ohio.

Engineers—Consulting Management
Trundle Engineering Co., Cleveland, Ohio.

Engineers—Designing
Taft Peirce, Woonsocket, Rhode Is.
Vulcan Tool Co., Dayton, Ohio.

Facing Machines—Precision
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.

Factory & Plant Sites
Zoll, Edward H., 207 Market St., Newark, N. J.

Fans—Ventilating
American Blower Corp., 6000 Russell St., Detroit, Mich.
Buffalo (N. Y.) Forge Co., 492 Broadway.
DeVilbiss Co., The, Toledo, Ohio.
New York Blower Co., The, Chicago, Ill.

Felt—Wool Mechanical
American Felt Co., Glenville, Conn.

Fence—Chain Link
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland
Continental Steel Corp., Kokomo, Ind.
Page Steel & Wire Div. American Chain & Cable Co., Inc., Monessen, Pa.
Pittsburgh (Pa.) Steel Co.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

Fencing—Wire
Continental Steel Corp., Kokomo, Ind.
Jones & Laughlin Steel Corp., Pittsburgh.

Ferroalloys
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Molybdenum Corp. of America, Pittsburgh, Pa.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Titanium Alloy Mfg. Co., The, Niagara Falls, New York.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Ferrochrome
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank, & Co., Inc., Philadelphia.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Ferromanganese
Bethlehem (Pa.) Steel Company.
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Jones & Laughlin Steel Corp., Pittsburgh.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank, & Co., Inc., Philadelphia.

Ferromolybdenum
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.
Molybdenum Corp. of America, Pittsburgh, Pa.

Ferrosilico Manganese
Ohio Ferro-Alloys Corp., Canton, Ohio.

Ferrosilicon
Cleveland-Cliffs Iron Co., The, Cleveland, Ohio.
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Ohio Ferro-Alloys Corp., Canton, Ohio.
Samuel, Frank, & Co., Inc., Philadelphia.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Ferrosilicon Aluminum
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Ferrospiegeleisen
New Jersey Zinc Co., The, 160 Front St., New York City.

Ferrotitanium
Titanium Alloy Mfg. Co., The, Niagara Falls, New York.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Ferrovanadium
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Files & Rasps
Atkins, E. C., & Co., 406 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Nicholson File Co., Providence, R. I.

Filing Machines
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.

Filter Cloth—Asbestos
Johns-Manville Corp., 22 East 40th St., New York City.

Filters—Oil
National Acme Co., The, Cleveland.

Fire Extinguishing Systems
Cardox Corp., Chicago, Ill.

Fittings—Tube
Weatherhead Co., The, Cleveland, Ohio

Flame Hardening
Air Reduction, 60 East 42nd St., New York City.
Fellows Gear Shaper Co., The, Springfield, Vt.
Gleason Works, Rochester, New York.
Linde Air Products Company, The, 30 East 42nd St., New York City.
National Cylinder Gas Co., Chicago, Ill.
National Erie Corp., Erie, Pa.

Flanges—Forged Steel
Harrisburg (Pa.) Steel Corp.
Kropp Forge Co., Chicago, Ill.
Standard Steel Wks. Div. The Baldwin Locomotive Works, Phila., Pa.

Flanges—Welded Steel
King Fifth Wheel Co., 2915 N. Second St., Philadelphia.

Flasks—Foundry
Truscon Steel Co., Pressed Steel Div., Cleveland, Ohio.

Flexible Shaft Equipment
Fischer, Charles, Spring Co., The, 240 Kent Ave., Brooklyn, N. Y.
Lovejoy Flexible Coupling Co., 4979 Lake St., Chicago, Ill.
Walker-Turner Co., Inc., Plainfield, N. J.

Flooring—Acid Proof
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Flooring—Monolithic
Carey, Philip, Mfg. Co., The, Cincinnati, O.
Johns-Manville Corp., 22 East 40th St., New York City.

Flooring—Steel
Alan Wood Steel Co., Conshohocken, Pa.
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Inland Steel Co., Chicago.

Flux—Soldering & Welding
American Chemical Paint Co., Ambler, Pa.
Handy & Harman, 82 Fulton St., New York City.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
Ruby Chemical Co., Columbus, Ohio.
Tip-IT-Co., 1504 Methyl St., Pittsburgh, Pa.

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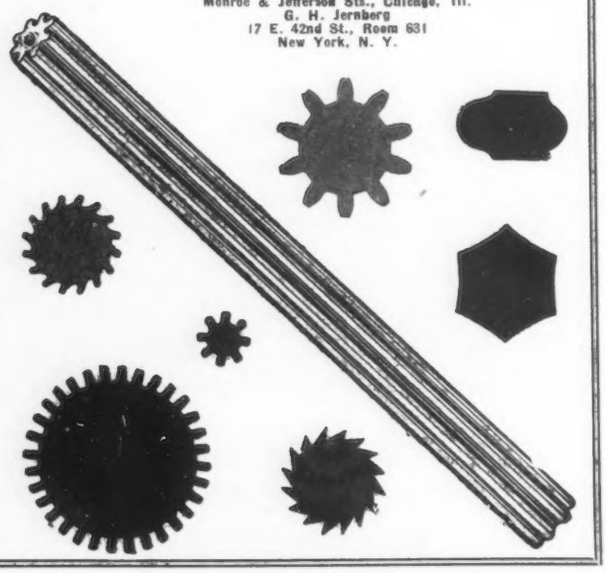

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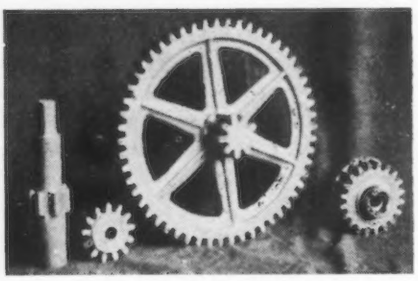

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Ajax Mfg. Co., The, Cleveland, Ohio.

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American Brass Co., The, Waterbury, Conn.
Bridgeport (Conn.) Brass Co.
Commonwealth Brass Corp., Detroit, Mich.
Cramp Brass & Iron Foundries Div. of The Baldwin Locomotive Wks., Philadelphia.
Harvey Metal Corp., The, Chicago, Ill.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Titan Metal Mfg. Co., Bellefonte, Pa.
Transue & Williams Steel Forging Corp., Alliance, Ohio.

Forgings—Drop
Atlas Drop Forge Co., Lansing, Mich.
Canton (Ohio) Drop Forging & Mfg. Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Champion Machine & Forging Co., The, Cleveland, Ohio.
Herbrand Corp., The, Fremont, Ohio.
Kropp Forge Co., Chicago, Ill.
Oliver Iron & Steel Corp., 10th & Muriel Sts., Pittsburgh, Pa.
Phoenix Mfg. Co., Catasauqua, Pa.
Rockford (Ill.) Drop Forge Co.
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Wilcox, D., Mfg. Co., The, Mechanicsburg, Pa.
Williams, J. H., & Co., Buffalo, N. Y.

Forgings—Hollow Bored
Erie (Pa.) Forge Co.
Harrisburg (Pa.) Steel Corp.
Kropp Forge Co., Chicago, Ill.
Midvale Co., The, Nicetown, Phila., Pa.
National Forge & Ordnance Co., Irvine, Pa.

Forgings—Iron & Steel
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
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Bay City Forge Co., Erie, Pa.
Bethlehem (Pa.) Steel Company.
Erie (Pa.) Forge Co.
Heppenstall Co., Pittsburgh.
Kropp Forge Co., Chicago, Ill.
Mesta Mch. Co., Pittsburgh.
Midvale Co., The, Nicetown, Phila., Pa.
National Forge & Ordnance Co., Irvine, Pa.
Phoenix Mfg. Co., Catasauqua, Pa.
Standard Steel Wks. Div. The Baldwin Locomotive Works, Phila., Pa.
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

Forgings—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

Forgings—Upset
Bethlehem (Pa.) Steel Company.
Emerson-Scheuring Tank Co., 2073 2073 Martindale Ave., Indianapolis, Ind.
Kropp Forge Co., Chicago, Ill.
Lamson & Sessions Co., The, Cleveland.
Oliver Iron & Steel Corp., 10th & Muriel Sts., Pittsburgh, Pa.
Rockford (Ill.) Drop Forge Co.
Standard Tube Co., The, Detroit, Mich.

Foundry Equipment & Supplies
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Frogs & Switches—Railway
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

Furnace Atmosphere Controls
Wilson Lee Engineering Co., Cleveland, Ohio.

Furnaces—Billet or Ingot Heating
Amsler-Morton Co., The, Pittsburgh, Pa.
Dempsey Industrial Furnace Corp., Springfield, Mass.
Salem Engineering Co., Salem, Ohio.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, Ohio.
Swindell-Dressler Corp., Box 1888, Pittsburgh, Pa.
Vulcan Corporation, Philadelphia, Pa.
Wean Engineering Co., Inc., Warren, Ohio.
Wilson Lee Engineering Co., Cleveland, Ohio.

Furnaces—Brazing
Ajax Electrothermic Corp., Trenton, New Jersey.
Vulcan Corporation, Philadelphia, Pa.

Furnaces—Electric Induction
Ajax Electrothermic Corp., Trenton, New Jersey.
Upton Electric Furnace Div. Commerce Pattern Fdry. & Machine Co., 7443 Melville Ave., Detroit, Mich.

Furnaces—Electric, Steel Melting
Ajax Electrothermic Corp., Trenton, New Jersey.
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Detroit Electric Furnace Div. Kuhlman Electric Co., Bay City, Mich.
Pittsburgh (Pa.) Lectromelt Furnace Corp.
Swindell-Dressler Corp., Box 1888, Pittsburgh, Pa.

Furnaces—Forging
Ajax Electric Co., Inc., 899 Frankford Ave., Philadelphia, Pa.
Dempsey Industrial Furnace Corp., Springfield, Mass.
Despatch Oven Co., Minneapolis, Minn.
Drever Co., The, Philadelphia, Pa.
Electric Furnace Co., The, Salem, Ohio.
Holcroft & Co., Detroit.
Loftus Engineering Co., Pittsburgh, Pa.
Mahr Mfg. Co. Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Salem Engineering Co., Salem, Ohio.
Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, Ohio.
Swindell-Dressler Corp., Box 1888, Pittsburgh, Pa.
Vulcan Corporation, Philadelphia, Pa.
Wean Engineering Co., Inc., Warren, Ohio.
Wilson Lee Engineering Co., Cleveland, Ohio.

Furnaces—Galvanizing
Dempsey Industrial Furnace Corp., Springfield, Mass.
General Electric Co., Schenectady, N. Y.
Holden, A. F., Co., The, New Haven, Conn.
Salem Engineering Co., Salem, Ohio.
Stewart Furnace Div., Chicago, Flexible Shaft Co., Chicago.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, Ohio.
Vaughn Machinery Co., The, Cuyahoga Falls, Ohio.
Vulcan Corporation, Philadelphia, Pa.
Wilson Lee Engineering Co., Cleveland, Ohio.

Furnaces—Heat Treating, Electric
Ajax Electric Co., Inc., 899 Frankford Ave., Philadelphia, Pa.
Ajax Electrothermic Corp., Trenton, New Jersey.
Despatch Oven Co., Minneapolis, Minn.
Electric Furnace Co., The, Salem, Ohio.
General Electric Co., Schenectady, N.Y.
Holcroft & Co., Detroit.
Holden, A. F., Co., The, New Haven, Conn.
Hoskins Mfg. Co., Detroit, Mich.
Leeds & Northrup Co., 4966 Stenton Ave., Philadelphia.
Lindberg Engineering Co., 2452 W. Hubbard St., Chicago, Ill.
Mahr Mfg. Co. Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
R-S Products Corp., Philadelphia, Pa.
Rockwell, W. S., Co., 50 Church St., N. Y. C.
Salem Engineering Co., Salem, Ohio.
Swindell-Dressler Corp., Box 1888, Pittsburgh, Pa.
Upton Electric Furnace Div. Commerce Pattern Fdry. & Machine Co., 7443 Melville Ave., Detroit, Mich.
Vulcan Corporation, Philadelphia, Pa.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Furnaces—Heat Treating, Oil or Gas
American Gas Furnace Co., Elizabeth, N. J.
Dempsey Industrial Furnace Corp., Springfield, Mass.
Despatch Oven Co., Minneapolis, Minn.
Drever Co., The, Philadelphia, Pa.
Electric Furnace Co., The, Salem, Ohio.
Holcroft & Co., Detroit.
Holden, A. F., Co., The, New Haven, Conn.
Lindberg Engineering Co., 2452 W. Hubbard St., Chicago, Ill.
Loftus Engineering Co., Pittsburgh, Pa.
Mahr Mfg. Co. Div. of Diamond Iron Works, Inc., Minneapolis, Minn.
Pennsylvania Industrial Engineers, Pittsburgh.
R-S Products Corp., Philadelphia, Pa.
Rockwell, W. S., Co., 50 Church St., New York City.
Salem Engineering Co., Salem, Ohio.
Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, Ohio.
Swindell-Dressler Corp., Box 1888, Pittsburgh, Pa.
Vulcan Corporation, Philadelphia, Pa.
Wean Engineering Co., Inc., Warren, Ohio.
Wilson Lee Engineering Co., Cleveland, Ohio.

Furnaces—Non-Ferrous Melting
Ajax Electrothermic Corp., Trenton, New Jersey.
Dempsey Industrial Furnace Corp., Springfield, Mass.
Detroit Electric Furnace Div. Kuhlman Electric Co., Bay City, Mich.
Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.
Wilson Lee Engineering Co., Cleveland, Ohio.

Furnaces—Open Hearth
Amsler-Morton Co., The, Pittsburgh, Pa.

PRODUCTS INDEX

McKee, Arthur G., & Co., Cleveland, Ohio.
Pennsylvania Engineering Works, New Castle, Pa.
Swindell-Dressler Corp., Box 1888, Pittsburgh, Pa.

Furnaces—Rivet Heating
Despatch Oven Co., Minneapolis, Minn.
Stewart Furnace Div., Chicago Flexible Shaft Co., Chicago.
Surface Combustion Div. of General Properties Co., Inc., 2375 Dorr St., Toledo, Ohio.

Furnaces—Sheet & Tin Mill
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Swindell-Dressler Corp., Box 1888, Pittsburgh, Pa.
Wean Engineering Co., Inc., The, Warren, Ohio.

Gage Blocks
Janssen Gage Co., Detroit, Michigan.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Scherr, George Co., Inc., 126-128 Lafayette St., New York City.

Gages—Electric
Sheffield Corp., The, Gage Div., Dayton, Ohio.

Gages—Plug and Snap
Greenfield (Mass.) Tap & Die Corp.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Sheffield Corp., The, Gage Div., Dayton, Ohio.
Taft-Peirce Mfg. Co., The Woonsocket, R. I.

Gages—Sheet Thickness
Pratt & Whitney Div. Niles-Bement Pond Co., West Hartford, Conn.

Gages—Thread
Brown & Sharpe Mfg. Co., Providence, R. I.
Detroit (Mich.) Tap & Tool Co.
Greenfield (Mass.) Tap & Die Corp.
Jones & Lamson Mch., Co., Springfield, Vt.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Sheffield Corp., The, Gage Div., Dayton, Ohio.

Galvanizing—Hot Dip
American Hot Dip Galvanizers Association, Inc., Pittsburgh, Pa.
Cattie, Joseph P., & Bros., Phila.
Enterprise Galvanizing Co., Philadelphia.
Southern Galvanizing Co., Baltimore, Md.

Galvanizing Equipment—Electro
Meaker Co., The, Chicago, Ill.

Galvanizing Equipment—Wire
Vaughn Machinery Co., The, Cuyahoga Falls, Ohio.

Galvanizing Plants—For Sheets
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Erie (Pa.) Foundry Co.
Wean Engineering Co., Inc., The, Warren, Ohio.

Gas Producers
Koppers Co., Engineering & Construction Div., Pittsburgh.
Morgan Construction Co., Worcester, Mass.
Wood, R. D., & Co., Philadelphia, Pa.

Gas Scrubbers
Koppers Co., Engineering & Construction Div., Pittsburgh, Pa.
Pennsylvania Engineering Works, New Castle, Pa.
Research Corp., 405 Lexington Ave., New York City.

Gas—Boosters & Exhausters
Roots-Connersville Blower Corp., Connersville, Ind.

Gaskets—Asbestos, Metal or Rubber
Garlock Packing Co., The, Palmyra, N. Y.
Gasket Packing & Specialty Co., 298 Broadway, N. Y. C.
Johns-Manville Corp., 22 East 40th St., New York City.

Gear Checking Equipment
Fellows Gear Shaper Co., The, Springfield, Vt.
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., Detroit, Michigan.

Gear Cutting
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.

Gear Cutting Machines
Farrel-Birmingham Co., Inc., Buffalo, N. Y.
Fellows Gear Shaper Co., The, Springfield, Vt.
Gleason Works, Rochester, N. Y.
Newark (N. J.) Gear Cutting Machine Co.

Gear Drives—Herringbone
Continental Roll & Steel Fdry. Co., East Chicago, Ind.
Farrel-Birmingham Co., Inc., Buffalo, New York.
James, D. O., Mfg. Corp., 1120 W. Monroe St., Chicago, Ill.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.
Mesta Machine Co., Pittsburgh, Pa.
United Engineering & Fdry. Co., Pitgh.

Gear Hobbing Machines
Newark (N. J.) Gear Cutting Machine Co.

Gear Lapping Machines
Fellows Gear Shaper Co., The, Springfield, Vt.
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., Detroit, Michigan.

Gearmotors
Allis-Chalmers Mfg. Co., Milwaukee.
General Electric Co., Schenectady, N. Y.
James D. O. Mfg. Corp., 1120 W. Monroe St., Chicago, Ill.
Reliance Electric & Engineering Co., Cleveland, Ohio.
Westinghouse Elec. & Mfg. Co., East Ptgh.

Gear Planing Machines
Gleason Works, Rochester, N. Y.

Gear Shaping Machines
Fellows Gear Shaper Co., The, Springfield, Vt.

Gear Shaving Machines
Michigan Tool Co., Detroit, Mich.
National Broach & Machine Co., Detroit, Michigan.

Gear Testing Machines
Fellows Gear Shaper Co., The, Springfield, Vt.

Gear Tooth Burring Machines
Cross Gear & Machine Co., Detroit, Mich.

Gears—Carbon Hard-Surfaced
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.

Gears—Cut
Baush Machine Tool Co., Springfield, Mass.
Cleveland (Ohio) Worm & Gear Co., The, 3252 E. 80th Street.
Cone-Drive Div., Michigan Tool Co., Detroit, Mich.
Earle Gear & Machine Co., Phila.
Fairfield Mfg. Co., Lafayette, Ind.
Farrel-Birmingham Co., Inc., Buffalo, N. Y.
Fellows Gear Shaper Co., The, Springfield, Vt.
Foote, Brad, Gear Works, Cicero, Ill.
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago.
Gleason Works, Rochester, N. Y.
Hartford (Conn.) Special Machinery Co., The.
James D. O. Mfg. Corp., 1120 W. Monroe St., Chicago, Ill.
Medart Co., The, St. Louis, Mo.
Mesta Machine Co., Pittsburgh.
Philadelphia Gear Works, Philadelphia, Pa.
National Erie Corp., Erie, Pa.
Pyott Foundry & Machine Co., Chicago, Ill.
Simonds Gear & Mfg. Co., The, Pittsburgh.
Swiss-American Gear Mfg. Co., 5003 Chrysler Bldg., New York, N. Y.
Taylor-Wilson Mfg. Co., 25 Thomson St., McKees Rocks, Pa.

Gears—Ground Teeth
Hartford (Conn.) Special Machinery Co., The.

Gears—Helical
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.

Gears—Machine Molded
Medart Co., The, St. Louis, Mo.
Poole Foundry & Mch. Co., Baltimore, Md.

Gears—Non-Metallic
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
James D. O. Mfg. Corp., 1120 W. Monroe St., Chicago, Ill.
Philadelphia Gear Works, Philadelphia, Pa.

Gears—Precision Ground
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.

Generator Sets—Gas & Diesel Engine Plants
Ready-Power Co., The, Detroit, Mich.

Generators—Acetylene
Air Reduction, 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
National Cylinder Gas Co., Chicago, Ill.

Generators—Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Fairbanks, Morse & Co., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Hobart Bros. Co., Troy, Ohio.
Reliance Electric & Engineering Co., Cleveland, Ohio.
Westinghouse Elec. & Mfg. Co., East Ptgh.

Generators—Plating
Meaker Co., The, Chicago, Ill.

Gloves—Asbestos & Fireproof
American Optical Co., Southbridge, Mass.
Industrial Gloves Co., Danville, Ill.

Goggles—Safety
American Optical Co., Southbridge, Mass.

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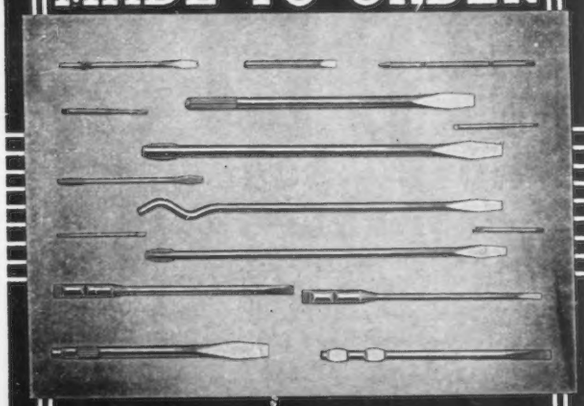

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Noble & Westbrook Mfg. Co., The, E. Hartford, Conn.

Grating
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Borden Metal Products Co., Elizabeth, New Jersey.
Dravo Corp., Machinery Div., Pittsburgh, Pa.
Hendrick Mfg. Co., Carbondale, Pa.

Grease—See Lubricants

Grilles—Perforated Metal
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, N. Y.
Harrington & King Perforating Co., The, Chicago.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.

Grinders—Carbide Tool
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
Hammond Machinery Builders, Inc., Kalamazoo, Mich.

Grinders—Cold Saw Sharpening
Atkins, E. C., & Co., 406 So. Illinois St., Indianapolis, Ind.
Motch & Merrryweather Machinery Co., The, Cleveland, Ohio.

Grinders—For Lathe & Planer Tools
Hammond Machinery Builders, Inc., Kalamazoo, Mich.
Sellers, William, & Co., Inc., 1620 Hamilton St., Phila., Pa.
Walker-Turner Co., Inc., Plainfield, N. J.

Grinding and Polishing Machines
Black & Decker Mfg. Co., The, Towson, Md.
Bridgeport Safety Emery Wheel Co., Inc., The, 1311 W. Broad St., Bridgeport, Conn.
Bryant Machinery & Engineering Co., Chicago.
Excelsior Tool & Mch. Co., E. St. Louis, Ill.
Gardner Machine Co., Beloit, Wis.
Hammond Machinery Builders, Inc., Kalamazoo, Mich.
Hill Acme Co., The, Cleveland, Ohio.
Norton Co., Worcester, Mass.
Vonnegut Moulder Corp., Indianapolis, Ind.

Grinding Machines—Centerless
Cincinnati (Ohio) Grinders Incorporated.

Grinding Machines—Chucking
Bryant Chucking Grinder Co., Springfield, Vt.
Fitchburg (Mass.) Grinding Machine Corp.
Landis Tool Co., Waynesboro, Pa.

Grinding Machines—Cylinder
Heald Machine Co., The, Worcester, Mass.

Grinding Machines—Cylindrical
Brown & Sharpe Mfg. Co., Providence, R. I.
Cincinnati (Ohio) Grinders Incorporated.
Fitchburg (Mass.) Grinding Machine Corp.
Landis Tool Co., Waynesboro, Pa.
Norton Co., Worcester, Mass.

Grinding Machines—Disc
Gardner Machine Co. Beloit, Wis.

Grinding Machines—Drill
Gallmeyer & Livingston Co., 200 Straight Ave., S. W., Grand Rapids, Mich.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

Grinding Machines—Face
Abrasive Machine Tool Co., East Providence, R. I.
Bridgeport Safety Emery Wheel Co., Inc., The, 1311 W. Broad St., Bridgeport, Conn.

Grinding Machines—Flexible Shaft
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

Grinding Machines—Gear & Worm
Fellows Gear Shaper Co., The, Springfield, Vt.
Fitchburg (Mass.) Grinding Machine Corp.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

Grinding Machines—Head
Fitchburg (Mass.) Grinding Machine Corp.

Grinding Machines—Internal
Bryant Chucking Grinder Co., Springfield, Vt.
Heald Machine Co., The, Worcester, Mass.
Sav-Way Tool & Machining Co., 13834 Jos. Campau Ave., Detroit, Mich.
Wicaco Machine Corp., The, Philadelphia, Pa.

Grinding Machines—Internal Multiple Spindle
Baird Mch. Co., The, Bridgeport, Conn.

Grinding Machines—Knife & Shear Blade
Bridgeport Safety Emery Wheel Co., Inc., 1311 W. Broad St., Bridgeport, Conn.
Hill Acme Co., The, Cleveland, Ohio.
Rogers, Samuel C., & Co., Buffalo, N. Y.

Grinding Machines — Portable Electric
Black & Decker Mfg. Co., The, Towson, Md.
Chicago (Ill.) Wheel & Mfg. Co., 1101 W. Monroe St.
Millers Falls Co., Greenfield, Mass.
Rotor Tool Co., The, Cleveland, Ohio.
Stanley Electric Tool Div., The, Stanley Works, New Britain, Conn.

Grinding Machines—Portable Pneumatic
Rotor Tool Co., The, Cleveland, Ohio.

Grinding Machines—Radius
Van Norman Machine Tool Co., Springfield, Mass.

Grinding Machines—Roll
Cincinnati (Ohio) Grinders Incorporated.
Farrel-Birmingham Co., Inc., Ansonia, Conn.
Landis Tool Co., Waynesboro, Pa.

Grinding Machines—Rotary Surface
Blanchard Machine Co., Cambridge, Mass.
Heald Machine Co., The, Worcester, Mass.

Grinding Machines—Spline
Fitchburg (Mass.) Grinding Machine Corp.

Grinding Machines—Surface
Abrasive Machine Tool Co., E. Prov., R. I.
Blanchard Machine Co., Cambridge, Mass.
Fitchburg (Mass.) Grinding Machine Corp.
Gallmeyer & Livingston Co., 200 Straight Ave., S. W., Grand Rapids, Mich.
Heald Machine Co., The, Worcester, Mass.
Hill Acme Co., The, Cleveland, Ohio.
Leach, H., Machinery Co., Providence, R. I.
Mattison Machine Works, Rockford, Ill.
Norton Co., Worcester, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.

Grinding Machines—Swing Frame
Black & Decker Mfg. Co., The, Towson, Md.
Shuster, F. B., Co., The, New Haven.
Vonnegut Moulder Corp., Indianapolis, Ind.

Grinding Machines—Tap
Gallmeyer & Livingston Co., 200 Straight Ave., S. W., Grand Rapids, Mich.
Jones & Lamson Machine Co., Springfield, Vt.

Grinding Machines—Thread
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
Jones & Lamson Machine Co., Springfield, Vt.
Landis Machine Co., Waynesboro, Pa.

Grinding Machines—Universal Cutter
Cincinnati (Ohio) Milling Mch. Co., The.
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.
Douglas Machinery Co., Inc., 150 Broadway, N. Y. C.
Fitchburg (Mass.) Grinding Machine Corp.
Gallmeyer & Livingston Co., 200 Straight Ave., S. W., Grand Rapids, Mich.
General Machinery Corp., Boston, Mass.
Landis Tool Co., Waynesboro, Pa.
LeBlond, R. K., Machine Tool Co., Cincinnati.
Norton Co., Worcester, Mass.

Grinding Wheels
Bay State Abrasive Products Co., Westboro, Mass.
Blanchard Machine Co., Cambridge, Mass.
Carborundum Co., The, Niagara Falls, N. Y.
Chicago (Ill.) Wheel & Mfg. Co., 1101 W. Monroe St.
Cortland Grinding Wheels Corp., Chester, Mass.
DeSanno, A. P., & Son, Inc., Phoenixville, Pa.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Towsend St. Passaic, N. J.
Norton Co., Worcester, Mass.
West Co., Inc., The, 1121 Shackamaxon St., Philadelphia, Pa.

Grinding Wheels—Mounted, Pencil
Bay State Abrasive Products Co., Westboro, Mass.
Chicago (Ill.) Wheel & Mfg. Co., 1101 W. Monroe St.
Norton Co., Worcester, Mass.

Grinding Wheels—Segment
Blanchard Machine Co., Cambridge, Mass.
Bridgeport Safety Emery Wheel Co., Inc., The, 1311 W. Broad St., Bridgeport, Conn.

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Cortland Grinding Wheels Corp., Chester, Mass.
DeSanno, A. P., & Son, Inc., Phoenixville, Pa.

Hammers—Air, Forging
Chambersburg (Pa.) Engineering Co.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Lobdell Co., Wilmington, Del.

Hammers, Chipping & Riveting
Black & Decker Mfg. Co., The, Towson, Md.

Hammers—Drop
Ajax Mfg. Co., The, Cleveland.
Alliance (Ohio) Machine Co., The.
Chambersburg (Pa.) Engineering Co.
Erie (Pa.) Foundry Co.
Morgan Engineering Co., The, Alliance, O.

Hammers—Helve
Bradley, C. C., & Son, Inc., Syracuse, N. Y.

Hammers—Power for Sheet Metal
Quickwork-Whiting Div. Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.
Yoder Co., The, Cleveland, Ohio.

Hammers—Steam
Alliance (Ohio) Machine Co., The.
Chambersburg (Pa.) Engineering Co.
Erie (Pa.) Foundry Co.
Morgan Engineering Co., The, Alliance, O.

Hangers—Shaft
Dodge Mfg. Corp., Mishawaka, Ind.
Fafnir Bearing Co., The, New Britain, Conn.
Hill Acme Co., The, Cleveland, Ohio.
Hyatt Bearings Div. General Motors Corp., Harrison, N. J.
S K F Industries, Inc., Front St. & Erie Ave., Phila., Pa.

Hardening Machines—Electric Induction
Ohio Crankshaft Co., The, Cleveland, Ohio.

Headed Specialties
Oliver Iron & Steel Corp., 10th & Muriel Sts., Pittsburgh, Pa.

Heading Machines
Ajax Mfg. Co., The, Cleveland, Ohio.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

Heads—Spun and Pressed
Worth Steel Co., Claymont, Del.

Heat Exchangers
Niagara Blower Co., Buffalo, New York.

Heat Treating
Agerstrand Corp., Muskegon, Mich.
Barnes-Gibson-Raymond, Detroit, Plant Div. of Associated Spring Corp.
Barnes, Wallace Co., Div. of Associated Spring Corp., Bristol, Conn.
Chapman Valve Mfg. Co., The, Indian Orchard, Mass.
General Machine Wks., York, Pa.
Holden, A. F., Co., The, New Haven, Conn.
Parish Pressed Steel Co., Reading, Pa.
Pennsylvania Industrial Engineers, Pittsburgh.
Van Dorn Iron Works Co., The, Cleveland, Ohio.

Heat Treating Compounds
Heatbath Corp., Springfield, Mass.
Houghton, E. F., & Co., Philadelphia, Pa.

Heaters—Unit
American Foundry Equipment Co., The, 519 S. Byrkit St., Mishawaka, Ind.
Despatch Oven Co., Minneapolis, Minn.
Dravo Corp., Machinery Div., Pittsburgh, Pa.
New York Blower Co., The, Chicago, Ill.

Helmets—Skull
Mine Safety Appliance Co., Pittsburgh, Pa.

Hobs
Brown & Sharpe Mfg. Co., Providence, R. I.

Hoists—Air
Curtis Pneumatic Mchry. Div. of Curtis Mfg. Co., 1948 Kienlen Ave., St. Louis, Mo.
Detroit (Mich.) Hoist & Mach. Co., 8207 Morrow St.
Northern Engineering Works, Detroit.

Hoists—Chain
Ford Chain Block Div. American Chain & Cable Co., Inc., Philadelphia, Pa.
Reading (Pa.) Chain & Block Corp.

Hoists—Electric
American Engineering Co., Philadelphia.
Cleveland Tramrail Div. of The Cleveland Crane & Engineering Co., 1115 East 283rd St., Wickliffe, Ohio.
Coneo Engineering Works Div. H. D. Conkey & Co., Mendota, Ill.
Detroit (Mich.) Hoist & Mach. Co., 8207 Morrow St.
ElectroLift, Inc., Hudson Terminal Bldg., 46 Church St., New York City.
Euclid Crane & Hoist Co., The, Euclid, O.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee, Wis.
Northern Engineering Works, Detroit, Mich.
Philadelphia Gear Works, Philadelphia, Pa.
Reading (Pa.) Chain & Block Corp.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

Hoists—Electric, Gasoline & Diesel
Silent Hoist Winch & Crane Co., 851-63rd St., Brooklyn, N. Y.

Hoists—Monorail
American Engineering Co., Philadelphia.
American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., 1115 East 283rd St., Wickliffe, Ohio.
ElectroLift, Inc., Hudson Terminal Bldg., 46 Church St., New York City.
Euclid Crane & Hoist Co., The, Euclid, O.
Northern Engineering Works, Detroit.
Robbins & Myers, Inc., Springfield, Ohio.
Shaw-Box Crane & Hoist Div. Manning, Maxwell & Moore, Inc., 402 Broadway, Muskegon, Mich.
Shepard Niles Crane & Hoist Corp., Montour Falls, N. Y.

Honing Machines
Micromatic Hone Corp., Detroit, Mich.

Hose—Flexible Metallic
American Brass Co., The, Waterbury, Conn.
Weatherhead Co., The, Cleveland, Ohio

Hose—Rubber
DeVilbiss Co., The, Toledo, Ohio.
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

Hydraulic Machinery
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Bliss, E. W., Co., 53rd St. & Second Ave., Brooklyn, N. Y.
Continental Roll & Steel Fdry Co., East Chicago, Ind.
Denison Engineering Co., The, 1160 Dublin Rd., Columbus, Ohio.
Farquhar, A. B., Co., Ltd., York, Pa.
Hannifin Mfg. Co., Chicago, Ill.
Lake Erie Engineering Corp., 68 Kenmore Sta., Buffalo, N. Y.
Morgan Engineering Co., The, Alliance, O.
Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.
Wood, R. D., & Co., Philadelphia, Pa.

Hydraulic Power Units
American Engineering Co., Philadelphia.
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
Sundstrand Machine Tool Co., Rockford, Ill.
Twin Disc Clutch Co., Racine, Wis.

Hydrogen
Air Reduction, 60 East 42nd St., New York City.

Induction Heating Equipment
Ajax Electrothermic Corp., Trenton, New Jersey.
Ohio Crankshaft Co., The, Cleveland, Ohio.

Ingot Mold—Plugs
National Carbon Co., Inc., Carbon Sales Div., Cleveland, Ohio.

Ingot Molds
Shenango Furnace Co., Pittsburgh, Pa.
Snyder, W. P., & Co., Pittsburgh, Pa.
Shenango-Penn Mold Co., Dover, Ohio.
Valley Mould & Iron Corp., Hubbard Ohio.

Ingots—Aluminum
Aluminum Co. of America, Pittsburgh.

Ingots—Phosphor Bronze
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.

Inhibitors
American Chemical Paint Co., Ambler, Pa.

Inspection Apparatus—Magnetic
Magnaflux Corp., 5902 Northwest Highway, Chicago, Ill.

Instruments—Electric, Indicating & Recording
Brown Instrument Co., The, Philadelphia, Pa.
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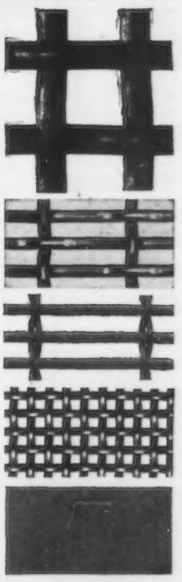

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Armstrong Cork Co., 978 Concord St., Lancaster, Pa.
Illinois Clay Products Co., Joliet, Ill.
Johns-Manville Corp., 22 East 40th St., New York City.

Jail & Prison Equipment
Van Dorn Iron Works Co., The, Cleveland, Ohio.

Jigs and Fixtures
Agerstrand Corp., Muskegon, Mich.
Braun & Murn, 118 E. 28th St., N.Y.C.
Hecker, A. W., 1980 East 66th St., Cleveland, Ohio.
Vulcan Tool Co., Dayton, Ohio.

Keys—Riveted
Western Wire Prods. Co., St. Louis, Mo.

Keyseating Machines
Baker Brothers, Inc., Toledo, Ohio.
Davis Keyseater Co., 400 Exchange St., Rochester, N. Y.

Lacing—Belt, Rawhide or Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Rhoads, J. E., & Sons, Philadelphia, Pa.

Lacquer, Varnish, Etc.
Egyptian Lacquer Mfg. Co., The, Rockefeller Center, New York.
Hilo Varnish Corp., 42-60 Stewart Ave., Brooklyn, N. Y.
Lowe Brothers Co., The, Dayton, Ohio.
New Wrinkle, Inc., Dayton, Ohio.

Ladles—Hot Metal
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Lamps—Industrial
General Electric Co., Lamp Dept., Nela Park, Cleveland.

Lapping Machines
Cincinnati (Ohio) Grinders Incorporated.
Ex-Cell-O Corp., 1210 Oakman Blvd., Detroit, Mich.
Norton Co., Worcester, Mass.
Ultra-Lap Machine Co., 255 McDougall Ave., Detroit, Mich.

Lapping Service
Ultra-Lap Machine Co., 255 McDougall Ave., Detroit, Mich.

Lathe Attachments
Hendey Machine Co., Torrington, Conn.
Jacobs Wind Electric Co., The, Minneapolis, Minn.
South Bend (Ind.) Lathe Works, 587 East Madison St.
Sundstrand Machine Tool Co., Rockford, Ill.

Lathes—Automatic
Baird Mch. Co., The, Bridgeport, Conn.
Bullard Co., The, Bridgeport, Conn.
Cross Gear & Machine Co., Detroit, Mich.
Coulter, James, Machine Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Goss & De Leeuw Mch. Co., New Britain, Conn.
Jones & Lamson Mch. Co., Springfield, Vt.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Lodge & Shipley Machine Tool Co., The, Cincinnati, Ohio.
Monarch Mch. Tool Co., The, Sidney, O.
Potter & Johnston Machine Co., Pawtucket, R. I.
Sundstrand Machine Tool Co., Rockford, Ill.

Lathes—Automatic Turret
Potter & Johnston Machine Co., Pawtucket, R. I.

Lathes—Automatic Vertical
Baird Mch. Co., The, Bridgeport, Conn.
Bullard Co., The, Bridgeport, Conn.

Lathes—Bench
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Sheldon Machine Co., Inc., Chicago, Ill.
South Bend (Ind.) Lathe Works, 587 East Madison St.

Lathes—Boring, Double End
Wickes Brothers, Saginaw, Mich.

Lathes—Crankshaft
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Potter & Johnston Machine Co., Pawtucket, R. I.
Sundstrand Machine Tool Co., Rockford, Ill.
Wickes Brothers, Saginaw, Mich.

Lathes—Engine & Toolroom
Bryant Machinery & Engineering Co., Chicago.
Cincinnati (Ohio) Lathe & Tool Co.
Enterprise Co., The, Columbiana, Ohio.
Hendey Machine Co. Torrington, Conn.
Hill-Clarke Mchry. Co., 647 W. Washington Blvd., Chicago.
LeBlond, R. K., Mch. Tool Co., Cincinnati.
Lodge & Shipley Machine Tool Co., The, Cincinnati, Ohio.
Monarch Mch. Tool Co., The, Sidney, O.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Reed-Prentice Corp., Worcester, Mass.
Rockford Machine Tool Co., Rockford, Ill.
Sheldon Machine Co., Inc., Chicago, Ill.
South Bend (Ind.) Lathe Works, 587 East Madison St.
Wickes Brothers, Saginaw, Mich.

Lathes—Roll
Continental Roll & Steel Fdry. Co., East Chicago, Ind.
Enterprise Co., The, Columbiana, Ohio.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.
Lodge & Shipley Machine Tool Co., The, Cincinnati, Ohio.
Mesta Mch., Co., Pittsburgh.
United Engineering & Fdry. Co., Pitgh.

Lathes—Speed
Schauer Machine Co., 2069 Reading Road, Cincinnati, Ohio.

Lathes—Turret
Acme Machine Tool Co., The, Cincinnati, Ohio.
Bardons & Oliver, Inc., Cleveland.
Bullard Co., The, Bridgeport, Conn.
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Mch. Co., Springfield, Vt.
Morey Machinery Co., Inc., 410 Broome St., New York City.
Potter & Johnston Mch. Co., Pawtucket, R. I.
Simmons Machine Tool Corp., Albany, N. Y.
South Bend (Ind.) Lathe Works, 587 East Madison St.
Warner & Swasey Co., The, Cleveland.

Lathes—Turret, Vertical
Bullard Co., The, Bridgeport, Conn.
Rogers Machine Works, Inc., Alfred, New York.

Lead Specialties
Gasket Packing & Specialty Co., 298 Broadway, N. Y. C.

Lead—Tellurium
National Lead Co., 111 Bdway., N. Y. C.

Leggins—Safety
American Optical Co., Southbridge, Mass.

Leveling Machines
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
McKay Machine Co., The, Youngstown, Ohio.
Schatz Mfg. Co., The, Poughkeepsie N. Y.
Streine Tool & Mfg. Co., New Bremen, Ohio.
Wean Engineering Co., Inc., The, Warren, O.

Levels—Precision Machine Aligning
Universal Boring Machine Co., Hudson, Mass.

Lighting—Industrial
Fleur-O-Lier Manufactures, Cleveland, Ohio.
General Electric Co., Lamp Dept., Nela Park, Cleveland, Ohio.
Pittsburgh Reflector Co., 407 Oliver Bldg., Pittsburgh, Pa.

Locomotives—Diesel
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Davenport Locomotive Works, a Div. of Davenport Besler Corp., Davenport, Iowa.
Porter, H. K., Co., Inc., Pittsburgh, Pa.

Locomotives—Fireless
Porter, H. K., Co., Inc., Pittsburgh, Pa.

Locomotives—Gasoline
Davenport Locomotive Works, a Div. of Davenport Besler Corp., Davenport, Iowa.
Plymouth (Ohio) Locomotive Works Div. Fate-Root-Heath Co.

Locomotives—Steam
Davenport Locomotive Works, a Div. of Davenport Besler Corp., Davenport, Iowa.
Iron & Steel Products, Inc., Chicago.
Porter, H. K., Co., Inc., Pittsburgh, Pa.

Lubricants—Industrial
Cities Service Oil Co., 60 Wall Tower, New York City.
Gulf Oil Corp., Gulf Refining Co., Pittsburgh.
Houghton, E. F., & Co., Philadelphia, Pa.
Shell's Industrial Lubricants Div., Shell Bldg., San Francisco, Shell Bldg., St. Louis, & 50 W. 50th St., N. Y. C.
Standard Oil Co. (Indiana), Chicago, Ill.
Stuart, D. A., Oil Co., Ltd., Chicago Ill.
Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
Tide Water Associated Oil Co., 17 Battery Place, N. Y. C.

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Lubricating Systems
Alemite Div. Stewart-Warner Corp., Chicago, Ill.

Machine Work
Fidelity Machine Co., Philadelphia, Pa.
General Machine Works, York, Pa.
Muench, H. E., P. O. Box 220, Stamford, Conn.
New York Engineering Co., 75 West St., New York City.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.

Machine Tool Drives
Cullman Wheel Co., 1330 Altgeld St., Chicago.

Machinists' Small Tools
Brown & Sharpe Mfg. Co., Providence, R. I.
Millers Falls Co., Greenfield, Mass.

Magnesia—Refractories
Basic Refractories, Inc., Cleveland, Ohio.

Magnesium
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

Magnets—Lifting
Cutler-Hammer, Inc., Milwaukee.
Dings Magnetic Separator Co., 517, East Smith St., Milwaukee.
Electric Controller & Mfg. Co., The, Cleveland.
Ohio Electric Mfg. Co., The, 5908 Maurice Ave., Cleveland.

Magnets—Permanent
Taylor-Wharton Iron & Steel Co., High Bridge, N. J.

Magnets—Separating—See Separators—Magnetic

Mandrels—Expanding
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.

Manganese Metal and Alloys
Electro Metallurgical Sales Corp., 30 East 42nd St., N. Y. C.

Manhole Fittings and Saddles
Worth Steel Co., Claymont, Del.

Marking Machines—For Metal
Noble & Westbrook Mfg. Co., The, E. Hartford, Conn.

Metal Cleaning Compounds
Ford, J. B., Sales Co., The, Wyandotte, Mich.
Holden, A. F., Co., The, New Haven, Conn.
MacDermid, Inc., Waterbury, Conn.
Magnus Chemical Co., 46 South Ave., Garwood, N. J.
Pennsylvania Salt Mfg. Co., Philadelphia.

Metal Specialties—See Stampings

Meters—Flow
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.
Roots-Connersville Blower Corp., Connersville, Ind.

Micrometers
Davis & Thompson Co., Milwaukee, Wis.
Scherr, George Co., Inc., 126-128 Lafayette St., New York City.

Microscopes
Pike, E. W., & Co., Elizabeth, New Jersey.

Microscopes—Toolmakers
Scherr, George Co., Inc., 126-128 Lafayette St., New York City.

Milling Machines—Automatic
Cincinnati (Ohio) Milling Mch. Co., The.
Jones & Lamson Machine Co., Springfield, Vt.
Kearney & Trecker Corp., Milwaukee, Wis.
Sundstrand Machine Tool Co., Rockford, Ill.

Milling Machines—Continuous
Davis & Thompson Co., Milwaukee, Wis.
National Broach & Machine Co., Detroit, Michigan.
Sundstrand Machine Tool Co., Rockford, Ill.

Milling Machines—Hand
Atlantic Machinery Corp., 149 Broadway, New York City.

Milling Machines—Horizontal
Bradley, C. C., & Son, Inc., Syracuse, New York.
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.
Douglas Machinery Co., Inc., 150 Broadway, N. Y. C.
Kearney & Trecker Corp., Milwaukee, Wis.
Simmons Machine Tool Corp., Albany, N. Y.
Sundstrand Machine Tool Co., Rockford, Ill.
Van Norman Machine Tool Co., Springfield, Mass.

Milling Machines—Planer Type
Cincinnati (Ohio) Planer Co.
Consolidated Machine Tool Corp., Rochester, New York.
Sellers, William, & Co., Inc., 1620 Hamilton St., Philadelphia, Pa.

Milling Machines—Planetary
Hall Planetary Co., The, Philadelphia, Pa.
Plan-O-Mill Corp., Royal Oak, Mich.

Milling Machines—Ram Type Universal
Van Norman Machine Tool Co., Springfield, Mass.

Milling Machines—Thread
Coulter, James, Machine Co., The, Bridgeport, Conn.
Hall Planetary Co., The, Philadelphia, Pa.
Plan-O-Mill Corp., Royal Oak, Mich.

Milling Machines—Universal
Brown & Sharpe Mfg. Co., Providence, R. I.
Cross Gear & Machine Co., Detroit, Mich.
Kearney & Trecker Corp., Milwaukee, Wis.

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Blank & Buxton Machinery Co., Jackson, Mich.
Brown & Sharpe Mfg. Co., Prov., R. I.
Cincinnati (Ohio) Milling Mch. Co., The.
Kearney & Trecker Corp., Milwaukee, Wis.
Leach, H., Machinery Co., Providence, R. I.
National Broach & Machine Co., Detroit, Michigan.
Reed-Prentice Corp., Worcester, Mass.
Sundstrand Machine Tool Co., Rockford, Ill.

Milling & Profiling Machines
Morey Machinery Co., Inc., 410 Broome St., New York City.

Molding Machines
Milwaukee (Wis.) Foundry Equipment Co.
Osborn Mfg. Co., The, Cleveland, Ohio.
Tabor Mfg. Co., The, Philadelphia, Pa.

Molybdenum
Climax Molybdenum Co., 500 Fifth Ave., N. Y. C.
Molybdenum Corp. of America, Pittsburgh, Pa.

Monel Metal
International Nickel Co., Inc., The, 67 Wall St., N. Y. C.

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American Monorail Co., The, Cleveland.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., 1115 East 283rd St., Wickliffe, Ohio.

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Allis-Chalmers Mfg. Co., Milwaukee.
Delco Products Div. General Motors Corp., Dayton, Ohio.
Fairbanks, Morse & Co., Chicago.
General Electric Co., Schenectady, N. Y.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.
Howell Electric Motors Co., Howell, Mich.
Lincoln Electric Co., The, Cleveland.
Reliance Electric & Engineering Co., Cleveland, Ohio.
Robbins & Myers, Inc., Springfield, Ohio.
Westinghouse Elec. & Mfg. Co., E. Pittsburgh.
Dickson Weatherproof Nail Co., Evanston, Ill.

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American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Hassall, John, Inc., 405 Oakland St., Bklyn., N. Y.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Brothers, Inc., Cortland, N. Y.
Youngstown (Ohio) Sheet & Tube Co., The.

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United States Bronze Sign Co., Inc., 570 Broadway, New York City.

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Campbell, Andrew C., Div. of American Chain & Cable Co., Inc., Bridgeport, Conn.
Gray Machine Co., Philadelphia.

Nibs—Lathe & Grinder Center
McKenna Metals Co., Latrobe, Pa.

Nickel
International Nickel Co., Inc., The, 67 Wall St., N. Y. C.

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Air Reduction Co., 60 East 42nd St., New York City.

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American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Norton Co., Worcester, Mass.

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Noble & Westbrook Mfg. Co., The, E. Hartford, Conn.

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Waterbury (Conn.) Farrel Foundry & Machine Co., The.

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Sun Oil Co., Philadelphia.
Texas Company, The, 135 East 42nd St., N. Y. C.
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Pickands Mather & Co., Cleveland, Ohio.
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Snyder, W. P., & Co., Pittsburgh, Pa.

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Cuban-American Manganese Corp., 122 East 42nd St., N. Y. C.

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Holcroft & Co., Detroit, Mich.
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Carey, Philip, Mfg. Co., The, Cincinnati, Ohio.
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Hewitt Rubber Corp., Buffalo, N. Y.
Johns-Manville Corp., 22 East 40th St., New York City.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.

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American Felt Co., Glenville, Conn.

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Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
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Hilo Varnish Corp., 42-60 Stewart Ave., Brooklyn, N. Y.
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Truscon Laboratories, Detroit, Mich.

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Mundt, Chas., & Sons, 59 Fairmount Ave., Jersey City, N. J.
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Meaker Co., The, Chicago, Ill.
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National Lead Co., 111 Bdway, N. Y. C.

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Jackson (Ohio), Iron & Steel Co., The.

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Bridgeport (Conn.) Brass Co.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

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National Carbon Co., Inc., Carbon Sales Div., Cleveland, Ohio.

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Wood, R. D., & Co., Philadelphia, Pa.

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Wheeling (W. Va.) Steel Corp.
Youngstown (Ohio) Sheet & Tube Co., The.

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Van Dorn Iron Works Co., The, Cleveland, Ohio.

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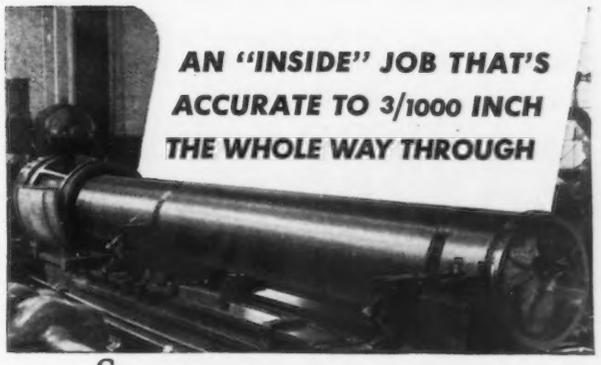

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Fairbanks, Morse & Co., Chicago.
Logansport (Ind.) Machine, Inc.
Ruthman Machinery Co., The, Cincinnati, Ohio.
Tomkins-Johnson Co., The, Jackson, Mich.

Pumps—Coolant
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Brown & Sharpe Mfg. Co., Providence, R. I.
Gray-Mills Co., Chicago, Ill.
Pioneer Engineering & Mfg. Co., Detroit, Mich.
Ruthman Machinery Co., The, Cincinnati, Ohio.

Pumps—Hydraulic
American Engineering Co., Philadelphia, Pa.
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Fairbanks, Morse & Co., Chicago.
Farquahar, A. B., Co., Ltd., York, Pa.
Hydraulic Press Mfg. Co., The, Mt. Gilead, Ohio.
Hydropress, Inc., 570 Lexington Ave., New York City.
LaPointe Machine Tool Co., The, Hudson, Mass.
Logemann Bros. Co., Milwaukee, Wis.
Racine (Wis.) Tool & Machine Co.
Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.

Pumps—Rotary
Crane Co., Chicago.
Roots-Connersville Blower Corp., Connersville, Ind.
Vickers, Inc., 1420 Oakman Blvd., Detroit, Mich.

Punches
Cleveland (Ohio) Punch & Shear Works Co., The.
Cleveland Steel Tool Co., The, 660 E. 82nd St., Cleveland, Ohio.
Kling Bros. Engineering Works, Chicago, Ill.

Punching and Shearing Machines
Beatty Machine & Mfg. Co., 936-150th St., Hammond, Ind.
Bertsch & Co., Cambridge City, Ind.
Buffalo (N. Y.) Forge Co., 492 Broadway.
Cincinnati (Ohio) Shaper Co., The.
Cleveland (Ohio) Punch & Shear Works Co., The.
Excelsior Tool & Mach. Co., E. St. Louis, Ill.
Federal Press Co., The, Elkhart, Ind.
Kling Bros. Engineering Works, Chicago, Ill.
Niagara Machine & Tool Works, Buffalo, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Thomas Mch. Mfg. Co., Pittsburgh.
Wickes Brothers, Saginaw, Mich.

Pyrometers
Brown Instrument Co., The, Philadelphia, Pa.
Hoskins Mfg. Co., Detroit, Mich.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

Racks—Box
Stackbin Corp., Providence, R. I.

Radium Products
Canadian Radium & Uranium Corp., 630 Fifth Ave., N. Y.

Rags—Wiping
Wiping Materials, Inc., 2000 No. Main St., St. Louis, Mo.

Railroad Equipment
Van Dorn Iron Works Co., The, Cleveland, Ohio.

Railroad Track Accessories
Oliver Iron & Steel Corp., 10th & Muriel Sts., Pittsburgh, Pa.

Rails
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Foster, L. B., Co., Inc., Pittsburgh.
N. Y. C.
Inland Steel Co., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.

Rails—Relaying
Foster, L. B., Co., Inc., Pittsburgh, Pa.
Frank, M. K., 480 Lexington Ave., N. Y. C.
Hyman-Michaels Co., Chicago.
Iron & Steel Products, Inc., Chicago.
Sherwood, E. C., 50 Church St., N. Y. C.

Reamers
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit, Mich.
Cleveland (Ohio) Twist Drill Co., The.
Genesee Tool Co., Fenton, Mich.
Gisholt Machine Co., Madison, Wisconsin.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio.

Reamers—Expansion
Apex Machine & Tool Co., The, Dayton, Ohio.
Geiring Tool Co., The, Detroit.
Greenfield (Mass.) Tap & Die Corp.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio.
Union Twist Drill Co., Athol, Mass.

Reaming Machines
Blanchard Machine Co., Cambridge, Mass.

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Recorders—Temperature
Brown Instrument Co., The, Philadelphia, Pa.
Hoskins Mfg. Co., Detroit, Mich.
Leeds & Northrup Co., 4956 Stenton Ave., Phila., Pa.

Refractories
Armstrong Cork Co., 978 Concord St., Lancaster, Pa.
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.
Bay State Abrasive Products Co., Westboro, Mass.
Illinois Clay Products Co., Joliet, Ill.
Norton Co., Worcester, Mass.
Ramtite Co., Div. S. Obermayer Co., The, 1805 S. Rockwell St., Chicago, Ill.

Refractories—Dolomite & Magnesia
Basic Refractories, Inc., Cleveland, Ohio.

Refrigerating Machines — Metals Aging, Etc.
Kold-Hold Mfg. Co., 438 North Grand Ave., Lansing, Mich.

Regulators—Compressed Gas
Air Reduction, 60 East 42nd St., N. Y. C.
DeVilbiss Co., The, Toledo, Ohio.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.

Reinforcement Fabric—Concrete
Pittsburgh (Pa.) Steel Co.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

Rings—Iron or Steel
Kropp Forge Co., Chicago, Ill.
Midvale Co., The, Nicetown, Phila., Pa.
Standard Steel Wks. Div. The Baldwin Locomotive Works, Phila., Pa.

Rings—Welded
King Fifth Wheel Co., 2915 N. Second St., Philadelphia.

Rivet Sets
Cleveland (Ohio) Punch & Shear Works Co., The.
Cleveland Steel Tool Co., The, 660 E. 82nd St., Cleveland, Ohio.

Riveting Machines
Hanniffin Mfg. Co., Chicago, Ill.
Shuster, F. B., Co., The, New Haven, Ct.
Tomkins-Johnson Co., The, Jackson, Mich.

Rivets
American Screw Co., Providence, R. I.
Clark Bros. Bolt Co., Milldale, Conn.
Harper, H. M., Co., The, 2607 Fletcher St., Chicago, Ill.
Hassall, John, Inc., 405 Oakland St., Bklyn., N. Y.
Keystone Bolt & Nut Corp., 60-62 Murray St., N. Y. C.
Oliver Iron & Steel Corp., 10th & Muriel Sts., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, Ohio.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

Rods—Aluminum
Aluminum Co. of America, Pittsburgh.

Rods—Brass, Bronze, Nickel Silver
American Brass Co., The, Waterbury, Conn.
Bridgeport (Conn.) Brass Co.
Bristol (Conn.) Brass Corp.
Phosphor Bronze Smelting Co., The, Phila., Pa.
Revere Copper & Brass., Inc., 230 Park Ave., New York City.
Seymour (Conn.) Mfg. Co., The.
Titan Metal Mfg. Co., Bellefonte, Pa.

Rods—Drill
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Kidd Drawn Steel Co., Aliquippa, Pa.

Rods—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

Rods—Threaded
Eastern Machine Screw Corp., The New Haven, Conn.

Roller Levelers—Backed Up
McKay Machine Co., The, Youngtsown, Ohio.

Rolling Mill Machinery
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Alliance (Ohio) Machine Co., The
Birdsboro (Pa.) Steel Foundry & Machine Co.
Bliss, E. W., Co., 53rd St. & Second Ave., Brooklyn, N. Y.
Cold Metal Products Co., The, Youngstown, Ohio.
Continental Roll & Steel Fdry. Co., East Chicago, Ind.
Farrel-Birmingham Co., Inc., Ansonia, Ct.
Hyde Park (Pa.) Foundry & Machine Co.
Hydropress, Inc., 370 Lexington Ave., New York City.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.
McKay Machine Co., The, Youngstown, Ohio.
Mesta Mch. Co., Pittsburgh.
Morgan Construction Co., Worcester Mass.
Morgan Engineering Co., The, Alliance, O.
National Roll & Fdry. Co., Avonmore, Pa.
Torrington (Conn.) Mfg. Co., The.
United Engineering & Fdry. Co., Ptgh.
Waterbury (Ct.) Farrel Fdry. & Mch. Co., The.

Rolls—Alloy Steel
Bethlehem (Pa.) Steel Company.
Continental Roll & Steel Fdry. Co., East Chicago, Ind.
McKay Machine Co., The, Youngstown, Ohio.
Midvale Co., The, Nicetown, Phila., Pa.
Ohio Steel Foundry Co., Lima, Ohio.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh.

Rolls—Bending and Straightening
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Bertsch & Co., Cambridge City, Ind.
Buffalo (New York) Forge Co., 492 Bdway.
Cleveland (Ohio) Punch & Shear Works Co., The.
Kane & Roach, Inc., Syracuse, N. Y.
Kling Bros. Engineering Works, Chicago, Ill.
McKay Machine Co., The, Youngstown, Ohio.
Niagara Machine & Tool Works, Buffalo, N. Y.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Wickes Brothers, Saginaw, Mich.
Yoder Co., The, Cleveland, Ohio.

Rolls—Rubber Covered
Hewitt Rubber Corp., Buffalo, N. Y.
Manhattan Rubber Mfg. Div. of Raybestos-Manhattan, Inc., The, 2 Townsend St., Passaic, N. J.

Rolls—Sand & Chilled
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Continental Roll & Steel Fdry. Co., East Chicago, Ind.
Hyde Park (Pa.) Foundry & Machine Co.
Lewis Foundry & Machine Div. of Blaw-Knox Co., Pittsburgh.
Mackintosh-Hemphill Co., Pittsburgh.
Mesta Mch. Co., Pittsburgh.
National Roll & Fdry. Co., Avonmore, Pa.
Ohio Steel Foundry Co., Lima, Ohio.
Pittsburgh Rolls Div. of Blaw-Knox Co., Pittsburgh.
United Engineering & Fdry. Co., Ptgh.

Rolls—Special Hardened
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.

Roofing—Steel Deck
Mahon, R. C., Co., Detroit, Mich.

Roofing and Siding—Corrugated and Plain
American Rolling Mill Co., The, Middletown, O.
Carey Philip Mfg. Co., The, Cincinnati O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Continental Steel Corp., Kokomo, Ind.
Inland Steel Co., Chicago.
Johns-Manville Corp., 22 East 40th St., New York City.
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Superior Sheet Steel Co., The, Canton, Ohio.
Wheeling (W. Va.), Steel Corp.

Roofing & Siding—Zinc
New Jersey Zinc Co., The, 160 Front St., New York City.

Roofing Materials
Carey, Philip Mfg. Co., The, Cincinnati O.
Koppers Co., Tar & Chemical Div., Pittsburgh, Pa.

Rust Preventives
Alrose Chemical Co., Cranston, Prov., R. I.
American Chemical Paint Co., Ambler, Pa.
Heatbath Corp., Springfield, Mass.
Houghton, E. F., & Co., Philadelphia, Pa.
Michigan Chrome & Chemical Co., 6338 East Jefferson Ave., Detroit, Mich.
Udylite Corp., The, Detroit, Mich.

Rust Proofing Process
Enterprise Galvanizing Co., Philadelphia.
Heatbath Corp., Springfield, Mass.
Mahon, R. C., Co., Detroit, Mich.
Southern Galvanizing Co., Baltimore, Md.
Udylite Corp., The, Detroit, Mich.
United Platers Inc., 989 Madison Ave., Detroit, Mich.

Sand Blast Equipment—See Blast Cleaning Equipment

Sand Conditioning Equipment
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.
Link-Belt Co., 300 West Pershing Road, Chicago, Ill.

Saw Filing & Grinding Machines
Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.

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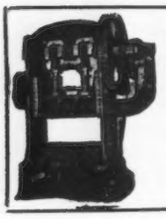
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Porter-McLeod Machine Tool Co., Inc., Hatfield, Mass.
Racine (Wis.) Tool & Machine Co.

Sawing Machines—Metal—Band
Armstrong-Blum Mfg. Co., Chicago, Ill.
Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.
Walker-Turner Co., Inc., Plainfield, N. J.
Wells Mfg. Corp., Three Rivers, Mich.

Sawing Machines—Power Hack
Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.
Peerless Machine Co., 1613 Junction Ave., Racine, Wis.

Saws—Band for Metal
Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Peerless Machine Co., 1613 Junction Ave., Racine, Wis.
Wells Mfg. Corp., Three Rivers, Mich.

Saws—Cold Saw
Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.
Espen-Lucas Machine Works, Philadelphia, Pa.
Motch & Merrryweather Machinery Co., The, Cleveland.
Peerless Machine Co., 1613 Junction Ave., Racine, Wis.
Porter McLeod Machine Tool Co., Inc., Hatfield, Mass.
Tabor Mfg. Co., The, Philadelphia, Pa.

Saws—Friction
Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Kling Bros. Engineering Works, Chicago, Ill.

Saws—Hack Saw Blades
Armstrong-Blum Mfg. Co., Chicago.
Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.
Barnes, W. O., Co., Inc., Detroit, Mich.
Diamond Saw Works, Inc., Buffalo, N. Y.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Millers Falls Co., Greenfield, Mass.
Peerless Machine Co., 1613 Junction Ave., Racine, Wis.

Saws—Hot Metal
Ajax Mfg. Co., The, Cleveland.
Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.

Saws—Portable Electric
Black & Decker Mfg. Co., The, Towson, Md.

Saws—Slotting
Atkins, E. C. & Co., 406 So. Illinois St., Indianapolis, Ind.
Greenfield (Mass.) Tap & Die Corp.
Peerless Machine Co., 1613 Junction Ave., Racine, Wis.

Scales
Fairbanks, Morse & Co., Chicago.
Toledo (Ohio), Scale Co.

Scrap Balers—See Baling Presses

Scrap Bundling Machines
Cox & Sons Co., The, Bridgeton, N. J.

Scrap-Iron & Steel
Dreifus, Charles, Co., The, Philadelphia, Pa.
Iron & Steel Products, Inc., Chicago, Ill.

Screens—Foundry
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Buffalo (New York) Wire Works Co., Inc.
Wickwire Brothers, Inc., Cortland, New York.

Screens—Perforated Metal
Accurate Perforating Co., Chicago, Ill.
Chicago Perforating Co., 2440 W. 24th Place, Chicago, Ill.
Diamond Mfg. Co., Wyoming, Pa.
Erdle Perforating Co., Rochester, New York.
Harrington & King Perforating Co., The, Chicago, Ill.
Hendrick Mfg. Co., Carbondale, Pa.
Mundt, Chas. A., Sons, 59 Fairmount Ave., Jersey City, N. J.

Screens—Woven Wire
Buffalo (New York) Wire Works Co., Inc.
Ludlow-Saylor Wire Co., The, St. Louis, Mo.
Wickwire Brothers, Inc., Cortland, New York.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

Screw Driving Tools
Apex Machine & Tool Co., The, Dayton, Ohio.
North Bros. Mfg. Co., Philadelphia, Pa.

Screw Machine Products
Blake & Johnson Co., The, Waterville, Conn.
Commonwealth Brass Corp., Detroit, Mich.
Eastern Mch. Screw Corp., New Haven, Ct.
Ericsson Screw Mch. Products Co., Inc., 25 Lafayette St., Bklyn., N. Y.
Mid-West Screw Products Co., 20 St. George St., St. Louis, Mo.
Miles, Franklin S., 2422-28 N. Mascher St., Phila., Pa.
National Acme Co., The, Cleveland.
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.
New England Screw Co., Keene, N. H.
Olson Mfg. Co., Worcester, Mass.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Peck Spring Co., The, Plainville, Conn.
R & L Tools, Philadelphia, Pa.
Reliance Machine & Mfg. Co., 30 Irving Place, N. Y. C.
Rhode Island Tool Co., Providence, R. I.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Wicaco Machine Corp., The, Philadelphia, Pa.

Screw Machine Tools
R & L Tools, Philadelphia.

Screw Machinery—Automatic
Acme Machine Tool Co., The, Cincinnati, Ohio.
Brown & Sharpe Mfg. Co., Providence, R. I.
City Engineering Co., Dayton, Ohio.
Cleveland (Ohio) Automatic Machine Co., The
Cone Automatic Machine Co., Inc., Windsor, Vt.
Greenlee Bros. & Co., Rockford, Ill.
National Acme Co., The, Cleveland.
New Britain-Gridley Machine Div., The, New Britain Machine Co., New Britain, Conn.
Wickman Corp., The, 15537 Woodrow Wilson Ave., Detroit, Mich.

Screw Machinery—Hand
Gisholt Machine Co., Madison, Wis.
Jones & Lamson Machine Co., Springfield, Vt.
Warner & Swasey Co., The, Cleveland.

Screw Machinery—Swiss Type
City Engineering Co., Dayton, Ohio.
Wickman Corp., 15537 Woodrow Wilson Ave., Detroit, Mich.

Screw Plates
Greenfield (Mass.) Tap & Die Corp.
Dickson Weatherproof Nail Co., Evanston, Ill.

Screws—Cap, Set, Safety Set & Machine
Blake & Johnson Co., The, Waterville, Conn.
Cleveland (Ohio) Cap Screw Co., The.
Continental Screw Co., New Bedford, Mass.
Ericsson Screw Mch. Products Co., Inc., 25 Lafayette St., Bklyn., N. Y.
Harper, H. M., Co., The, 2607 Fletcher St., Chicago, Ill.
Hassall, John, Inc., 405 Oakland St., Brooklyn, N. Y.
Keystone Bolt & Nut Corp., 60-62 Murray St., N. Y. C.
Lamson & Sessions Co., The, Cleveland.
Mid-West Screw Products Co., 20 St. George St., St. Louis, Mo.
National Acme Co., The, Cleveland.
National Screw & Mfg. Co., Cleveland, Ohio.
New England Screw Co., Keene, N. H.
Ottemiller, Wm. H., Co., Inc., York, Pa.
Parker-Kalon Corp., 200 Varick St., New York City.
Progressive Mfg. Co., The, Torrington, Conn.
Rhode Island Tool Co., Providence, R. I.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.
Shimer, Samuel J., & Sons, Inc., Milton, Pa.
Standard Pressed Steel Co., Jenkintown, Pa.
Triplex Screw Co., The, Cleveland, Ohio.

Screws—Recessed Head
American Screw Co., Providence, R. I.
Continental Screw Co., New Bedford, Mass.
Lamson & Sessions Co., The, Cleveland, Ohio.
National Screw & Mfg. Co., Cleveland, Ohio.
Parker-Kalon Corp., 200 Varick St., New York City.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N. Y.

Screws—Self Tapping Drive
Continental Screw Co., New Bedford, Mass.
New England Screw Co., Keene, N. H.
Parker-Kalon Corp., 200 Varick St., New York City.
Shakeproof, Inc., 2525 N. Keeler Ave., Chicago.

Separators—Magnetic
Dings Magnetic Separator Co., 517, East Smith St., Milwaukee.
Ohio Electric Mfg. Co., The, 5908 Maurice Ave., Cleveland.
Stearns Magnetic Mfg. Co., 635 S. 28th St., Milwaukee.

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Shafting
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Copperweld Steel Co., Warren, Ohio.
Erie (Pa.) Forge Co.
Jones & Laughlin Steel Corp., Pittsburgh.
Ryerson, Jos. T., & Son, Inc., Chicago.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.

Shafts—Carbon Hard-Surfaced
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.

Shapers
Cincinnati (Ohio) Shaper Co., The.
Hendey Machine Co., Torrington, Conn.
Rockford Machine Tool Co., Rockford, Ill.

Shapers—Vertical
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Rockford Machine Tool Co., Rockford, Ill.

Shear Blades & Knives
American Shear Knife Co., Homestead, Pa.
Atkins, E. C. & Co., 408 So. Illinois St., Indianapolis, Ind.
Cleveland (Ohio) Punch & Shear Works Co., The.
Heppenstall Co., Pittsburgh.
Hill Acme Co., The, Cleveland, Ohio.
Hill Acme Co., The, Canton Div., 6400 Breakwater Ave., Cleveland, Ohio.
Quickwork-Whiting Div. Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.
Wapakoneta (Ohio) Machine Co.

Shearing Machines
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Beatty Machine & Mfg. Co., 936-150th St., Hammond, Ind.
Bertsch & Co., Cambridge City, Ind.
Beverly Shear Co., Chicago, Ill.
Buffalo (N. Y.) Forge Co., 492 Broadway.
Cincinnati (Ohio) Shaper Co.
Cleveland (Ohio) Punch & Shear Works Co., The.
Federal Bearings Co., Inc., The, Poughkeepsie, N. Y.
Kling Bros. Engineering Works, Chicago, Ill.
McKay Machine Co., The, Youngstown, Ohio.
Mesta Machine Co., Pittsburgh, Pa.
Morgan Engineering Co., The, Alliance, O.
Niagara Machine & Tool Works, Buffalo, New York.
O'Neil-Irwin Mfg. Co., 302 8th Ave. S. Minneapolis, Minn.
Quickwork-Whiting Div. Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.
Schatz Mfg. Co., The, Poughkeepsie, N. Y.
Streine Tool & Mfg. Co., New Bremen, Ohio.
United Engineering & Fdry. Co., Ptgh.
Yoder Co., The, Cleveland, Ohio.

Shearing Machines—Alligator
Hill Acme Co., The, Canton Div., 6400 Breakwater Ave., Cleveland, Ohio.

Shearing Machines—Rotary
Bliss, E. W., Co., 53rd St. & Second Ave., Brooklyn, New York.
Cleveland (Ohio) Punch & Shear Works Co., The.
Niagara Machine & Tool Works, Buffalo, N. Y.
Quickwork-Whiting Div. Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Shearing Machines—Squaring
Bliss, E. W., Co., 53rd St. & Second Ave., Brooklyn, New York.
Cincinnati (Ohio) Shaper Co., The.
Cleveland (Ohio) Punch & Shear Works Co., The.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Streine Tool & Mfg. Co., New Bremen, Ohio.

Shears—Portable Electric
Stanley Electric Tool Div., The Stanley Works, New Britain, Conn.

Sheet Bars
Andrews Steel Co., The, Newport, Ky.
Continental Steel Corp., Kokomo, Ind.

Sheet Lifters
Cullen-Friestedt Co., 1303 S. Kilbourn Ave., Chicago.

Sheet Metal Fabrication
Craft Mfg. Co., Chicago, Ill.
Kirk & Blum Mfg. Co., The, Cincinnati, Ohio.
St. Paul Corrugating Co., St. Paul, Minn.
Stackbin Corp., Providence, Rhode Is.

Sheet Metal Machinery
Beverly Shear Co., Chicago, Ill.
Bliss, E. W., Co., 53rd St. & Second Ave., Brooklyn, N. Y.
Cincinnati (Ohio) Shaper Co., The.
Cleveland (Ohio) Punch & Shear Works Co., The.
Dreis & Krump Mfg. Co., Chicago.
Ferracute Machine Co., Bridgeton, New Jersey.
New Albany (Ind.) Mch. Mfg. Co.
Niagara Mach. & Tool Wks., Buffalo, N. Y.
Quickwork-Whiting Div. Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.
Streine Tool & Mfg. Co., New Bremen, Ohio.
V & O Press Co., Hudson, N. Y.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.
Yoder Co., The, Cleveland, Ohio.

Sheets—Aluminum
Aluminum Co. of America, Pittsburgh.

Sheets—Black
American Rolling Mill Co., The, Middletown, O.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Ingersoll Steel & Disc. Div. Borg-Warner Corp., Chicago.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Superior Sheet Steel Co., The, Canton, Ohio.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Wheeling (W. Va.), Steel Corp.

Sheets—Blue Annealed
Alan Wood Steel Co., Conshohocken, Pa.
American Rolling Mill Co., The, Middletown, O.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Ryerson, Jos. T., & Son, Inc., Chicago.

Sheets — Brass, Bronze, Copper, Nickel Silver or Phosphor Bronze
American Brass Co., The, Waterbury, Conn.
Bridgeport (Conn.) Brass Co.
Bristol (Conn.) Brass Corp.
Phosphor Bronze Smelting Co., The, Philadelphia, Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Seymour (Conn.) Mfg. Co., The.
Western Cartridge Co. Brass Mill Div., East Alton, Ill.

Sheets—Chromium Plated
American Nickeloid Co., 1312 North Second St., Peru, Ill.

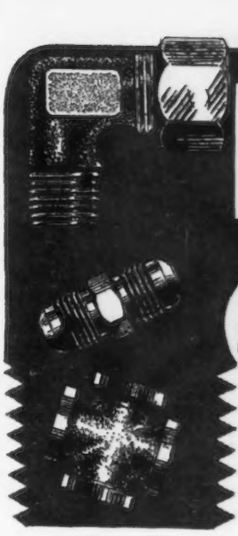
Sheets—Coated
American Nickeloid Co., 1312 North Second St., Peru, Illl.

Sheets—Copper Steel
American Rolling Mill Co., The, Middletown, Ohio.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Continental Steel Corp., Kokomo, Ind.
Granite City (Ill.) Steel Co.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Superior Sheet Steel Co., The, Canton, Ohio.
Wheeling (W. Va.) Steel Corp.

Sheets—Electrical
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, Ohio.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Wheeling (W. Va.), Steel Corp.

Sheets—For Drawing and Stamping
American Rolling Mill Co., The, Middletown, Ohio.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Inland Steel Co., Chicago, Ill.
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Wheeling (W. Va.), Steel Corp.
Worth Steel Co., Claymont, Del.

Sheets—Full Finished, for Motor Car, Furniture, Enameling
American Rolling Mill Co., The, Middletown, Ohio.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., Chicago, Ill.



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PRODUCTS INDEX

Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Weirton (W. Va.) Steel Co.
Wheeling (W. Va.), Steel Corp.
Youngstown (Ohio) Sheet & Tube Co., The.

Sheets—Galvanized
American Rolling Mill Co., The, Middletown, Ohio.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Continental Steel Corp., Kokomo, Ind.
Great Lakes Steel Corp., Ecorse, Detroit, Mich.
Inland Steel Co., Chicago.
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Superior Sheet Steel Co., The, Canton, Ohio.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.
Wheeling (W. Va.), Steel Corp.
Youngstown (Ohio) Sheet & Tube Co., The.

Sheets—Lead
National Lead Co., 111 Bdway, N. Y. C.

Sheets—Long Terne
American Rolling Mill Co., The, Middletown, Ohio.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Continental Steel Corp., Kokomo, Ind.
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.
Superior Sheet Steel Co., The, Canton, Ohio.
Wheeling (W. Va.), Steel Corp.

Sheets—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

Sheets—Stainless
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, Ohio.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.

Sheets—Stainless Clad
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago, Ill.

Sheets—Tin Mill Black
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Newport (Ky.) Rolling Mill Co., The, Div. of The Andrews Steel Co.
Wheeling (W. Va.), Steel Corp.

Sheets—Zinc
New Jersey Zinc Co., The, 160 Front St., New York City.

Shims
Laminated Shim Co., Inc., Glenbrook, Conn.

Shop Furniture
New Britain-Gridley Machine Div., The New Britain Machine Co., New Britain, Conn.

Shovels—Gasoline
Osgood Co., The, Marion, Ohio.

Shovels—Steam
Osgood Co., The, Marion, Ohio.

Shutters—Steel & Wood Bi-Folding
Kinnear Mfg. Co., The, Columbus, Ohio.

Silico-Manganese
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.

Silicon—Aluminum
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Silicon Metal & Alloys
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Slings—Chain
American Chain & Cable Co., Inc., York, Pa.

Slings—Wire Rope
Macwhyte Co., Kenosha, Wisc.
Roebling's, John A., Sons Co., Trenton, N. J.

Slitting Machines
Quickwork-Whiting Div. Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Slotters
Douglas Machinery Co., Inc., 150 Broadway, N. Y. C.
Lobdell Co., Wilmington, Del.
Rockford Machine Tool Co., Rockford, Ill.

Soaking Pits
Amsler-Morton Co., The, Pittsburgh, Pa.

Solder
Handy & Harman, 82 Fulton St., New York City.
Kester Solder Co., Chicago, Ill.

Special Machinery
Agerstrand Corp., Muskegon, Mich.
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Baush Machine Tool Co., Springfield, Mass.
Bayard, M. L., & Co., Inc., Philadelphia, Pa.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Bullard Co., The, Bridgeport, Conn.
Cleveland (Ohio) Automatic Machine Co., The.
Coulter, James, Machine Co., The, Bridgeport, Conn.
Davis & Thompson Co., Milwaukee, Wis.
Denison Engineering Co., The, 1160 Dublin Rd., Columbus, Ohio.
Durabilt Tool & Mfg. Corp., 38-75 Eleventh St., Long Island City, N. Y.
Eastern Tool & Mfg. Co., Bloomfield, N. J.
Fidelity Machine Co., Philadelphia, Pa.
Hartford (Conn.) Special Machinery Co., The.
Hill Acme Co., The, Cleveland, Ohio.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Morgan Engineering Co., The, Alliance, Ohio.
Nilson, A. H., Machine Co., Bridgeport, Conn.
Taft-Peirce Mfg. Co., The, Woonsocket, R. I.
Thomas Mch. Mfg. Co., Pittsburgh.
Torrington (Conn.) Mfg. Co., The.
Vulcan Tool Co., Dayton, Ohio.
Weatherly (Pa.) Foundry & Mfg. Co.
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.
Wood, R. D., & Co., Philadelphia, Pa.

Speed Reducers
Cleveland (Ohio) Worm & Gear Co., The, 3252 E. 80th Street.
Cullman Wheel Co., 1330 Altgeld St., Chicago, Ill.
Foote, Brad, Gear Works, Cicero, Ill.
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.
James, D. O., Mfg. Corp., 1120 W. Monroe St., Chicago, Ill.
Link-Belt Co., 2045 West Hunting Park Ave., Phila., Pa.
Philadelphia Gear Works, Philadelphia, Pa.
Poole Foundry & Mch. Co., Baltimore, Md.
Twin Disc Clutch Co., Racine, Wis.

Spiegeleisen
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
New Jersey Zinc Co., The, 160 Front St., New York City.

Spikes—Track
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.

Spindles—Boring
Sheffield Corp., The, Gage Div., Dayton, Ohio.

Spindles—Grinding
Ex-Cell-O Corp., 1210 Oakman Blvd. Detroit, Mich.

Spinnings
American Aluminum Ware Co., 372 Jelliff Ave., Newark, N. J.
Craft Mfg. Co., Chicago, Ill.

Splice Bars
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.

Spooling Machinery—Wire
Fidelity Machine Co., Philadelphia, Pa.

Spray Booths—Paint
DeVilbiss Co., The, Toledo, Ohio.
Mahon, R. C., Co., Detroit, Mich.

Sprayers—Paint
DeVilbiss Co., The, Toledo, Ohio.

Spring Making Machinery
Baird Mch. Co., The, Bridgeport, Conn.
Torrington (Conn.) Mfg. Co., The.

Springs
Accurate Spring Mfg. Co., 3819 W. Lake St., Chicago, Ill.
American Spring of Holly, Inc., Holly, Mich.

PRODUCTS INDEX

American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Athenia Steel Co., The, Clifton, N. J.
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co. Div. of Associated Spring Corp., Bristol, Conn.
Cook Plant of Barnes-Gibson-Raymond, Div. of Associated Spring Corp., Ann Arbor, Mich.
Cuyahoga Spring Co., The, Cleveland.
Duer Spring & Mfg. Co., McKees Rocks, Pa.
Dunbar Bros. Co., Div. of Associated Spring Corp., Bristol, Conn.
Fischer, Charles, Spring Co., The, 240 Kent Ave., Brooklyn, N. Y.
Hubbard, M. D., Spring Co., 330 Central Ave., Pontiac, Mich.
Hunter Pressed Steel Co., Lansdale, Pa.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
Mercer Spring Co., 109 Mercer St., New York City.
Muehlhausen Spring Corp., 817 Michigan Ave., Logansport, Ind.
Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.
U. S. Steel Wire Spring Co., Cleveland, O.
Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.

Sprockets
American Manganese Steel Div. of The American Brake Shoe & Foundry Co., Chicago Heights, Ill.
Cullman Wheel Co., 1330 Altgeld St., Chicago, Ill.
Foote, Brad, Gear Works, Cicero, Ill.
Link-Belt Co., 300 West Pershing Rd., Chicago, Ill.
Medart Co., The, St. Louis, Mo.
Morse Chain Co., Ithaca, N. Y.
Pyott Foundry & Machine Co., Chicago, Ill.
Whitney Chain & Mfg. Co., Hartford, Ct.

Stampings
Accurate Spring Mfg. Co., 3819 W. Lake St., Chicago, Ill.
American Aluminum Ware Co., 372 Jelliff Ave., Newark, N. J.
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co., Div. of Associated Spring Corp., Bristol, Conn.
Budd, Edward G., Mfg. Co., Phila., Pa.
Champion Sheet Metal Co., Inc., cor. Squires & Duane Sts., Cortland, N. Y.
Cook Plant of Barnes-Gibson-Raymond, Div. of Associated Spring Corp., Ann Arbor, Mich.
Craft Mfg. Co., Chicago, Ill.
Crown Products Co., 3401 Newton Ave., Indianapolis, Ind.
Davis Brake Beam Co., Laurel Ave. & A St., Johnstown, Pa.
Dunbar Bros. Co., Div. of Associated Spring Corp., Bristol, Conn.
Eastern Tool & Stpg. Co., Inc., Saugus, Mass.
Greist Mfg. Co., The, 646 Blake St., New Haven, Conn.
Guarantee Specialty Mfg. Co., Cleveland, Ohio.
Heintz Mfg. Co., Philadelphia, Pa.
Hubbard, M. D., Spring Co., 330 Central Ave., Pontiac, Mich.
Hunter Pressed Steel Co., Lansdale, Pa.
Judd, H. L., Co., Inc., 87 Chambers St., New York City.
Lansing (Mich.) Stamping Co., So. Penn. Ave.
Lee Spring Co., Inc., 30 Main St., Brooklyn, N. Y.
New England Pressed Steel Co., Natick, Mass.
Norlipp Co., The, Chicago, Ill.
Parish Pressed Steel Co., Reading, Pa.
Raymond Mfg. Co., Div. of Associated Spring Corp., Corry, Pa.
Reliance Machine & Mfg. Co., 30 Irving Place, N. Y. C.
Safe Padlock & Hardware Co., The, Lancaster, Pa.
Sessions, J. H., & Son, Hooker Court, Bristol, Conn.
Shakeproof, Inc., 2525 N. Keeler Ave., Chicago.
Stanley Works, The, New Britain, Conn.
Torrington (Conn.) Company.
Transue & Williams Steel Forging Corp., Alliance, Ohio.
Truscon Steel Co., Pressed Steel Div., Cleveland, Ohio.
United Metal Spinning Co., (Inc.), 446 Adelphi St., Brooklyn, N. Y.
Western Cartridge Co., Brass Mill Div., East Alton, Ill.
Whitehead Stamping Co., 1669 W. Lafayette Blvd., Detroit, Mich.
Worcester (Mass.) Pressed Steel Co., 104 Barber Ave.
Worcester (Mass.) Stamped Metal Co., 6 Hunt St.

Stamps—Steel
Cunningham, M. E., Co., Pittsburgh, Pa.
Matthews, Jas. H. & Co., Pittsburgh, Pa.
Noble & Westbrook Mfg. Co., The, E. Hartford, Conn.

Staples—Wire
Continental Steel Corp., Kokomo, Ind.
Keystone Steel & Wire Co., Peoria, Ill.
Wickwire Brothers, Inc., Cortland, N. Y.

Starters—Motor
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Steel—Alloy
Alan Wood Steel Co., Conshohocken, Pa.
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Andrews Steel Co., The, Newport, Ky.
Athenia Steel Co., The, Clifton, N. J.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Carpenter Steel Co., The, 121 W. Bern St., Reading Pa.
Copperweld Steel Co., Warren, Ohio.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Harrisburg (Pa.) Steel Corp.
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.
Inland Steel Co., Chicago, Ill.
Jessop Steel Co., Washington, Pa.
Latrobe (Pa.) Electric Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Stanley Works, The, New Britain, Conn., Bridgeport, Conn.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Youngstown (Ohio) Sheet & Tube Co., The.

Steel—Alloy, Cold Finished
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.
Wyckoff Drawn Steel Co., Pittsburgh.

Steel—Carbon Hard-Surfaced
Foote Bros. Gear & Machine Co., 5301 S. Western Blvd., Chicago, Ill.

Steel—Cobalt
Darwin & Milner, Inc., Cleveland.

Steel—Cold Drawn
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Jones & Laughlin Steel Corp., Pittsburgh.
Kidd Drawn Steel Co., Aliquippa, Pa.
Rathbone, A. B. & J., Palmer, Mass.
Ryerson, Joseph T., & Son, Inc., Chicago.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.

Steel—Composite Tool & Die
Jessop Steel Co., Washington, Pa.

Steel—Die
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., The, 121 W. Bern St., Reading Pa.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Jessop, Wm. & Sons, Inc., 627-629 Sixth Ave., N. Y. C.
Kloster Steel Corp., Chicago, Ill.
Latrobe (Pa.) Electric Steel Co.
Milne, A., & Co., 745 Washington St., New York City.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

Steel—Drill
Milne, A., & Co., 745 Washington St., New York City.

Steel—Electric
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, Ohio.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.

Steel—High Speed
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Baker, H. & Co., Inc., 101 Duane St., New York City.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Cleveland (Ohio) Twist Drill Co., The.
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.
Jessop Steel Co., Washington, Pa.
Latrobe (Pa.) Electric Steel Co.
Milne, A., & Co., 745 Washington St. New York City.
Vanadium-Alloys Steel Co., Latrobe, Pa.

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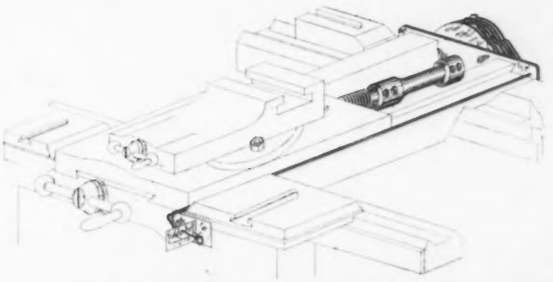

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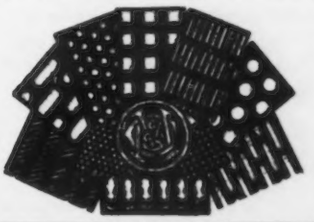

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Steel—Screw Stock
Bliss & Laughlin, Inc., Harvey, Ill.; Buffalo, N. Y.
Jones & Laughlin Steel Corp., Pittsburgh.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wyckoff Drawn Steel Co., Pittsburgh.

Steel—Spring
Athenia Steel Co., The, Clifton, N. J.
Barnes-Gibson-Raymond, Detroit Plant, Div. of Associated Spring Corp.
Barnes, Wallace Co., Div. of Associated Spring Corp., Bristol, Conn.
Cold Metal Products Co., The, Youngstown, Ohio.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Muehlhausen Spring Corp., 817 Michigan Ave., Logansport, Ind.
Republic Steel Corp., Cleveland, Ohio.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Youngstown (Ohio) Sheet & Tube Co., The.

Steel—Stainless
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
American Rolling Mill Co., The, Middletown, Ohio.
Andrews Steel Co., The, Newport, Ky.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Griffin Mfg. Co., Erie, Pa.
Jessop Steel Co., Washington, Pa.
Latrobe (Pa.) Electric Steel Co.
Midvale Co., Nicetown, Phila., Pa.
Pittsburgh (Pa.) Steel Co.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn., Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Union Drawn Steel Div. Republic Steel Corp., Massillon, Ohio.
Wetherell Bros. Co., Cambridge, 39, Mass.

Steel—Stainless Clad
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.
Jessop Steel Co., Washington, Pa.

Steel—Strip
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland.
Athenia Steel Co., The, Clifton, N. J.
Bethlehem (Pa.) Steel Company.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Cold Metal Products Co., The, Youngstown, Ohio.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Great Lakes Steel Corp., Ecorse, Detroit.
Griffin Mfg. Co., Erie, Pa.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Laclede Steel Co., St. Louis, Mo.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago.
Scully Steel Products Co. (U. S. Steel Corp. Subsidiary), Chicago.
Stanley Works, The, New Britain, Conn., Bridgeport, Conn.
Superior Steel Corp., Carnegie, Pa.
Thomas Steel Co., The, Warren, Ohio.
Wetherell Bros., Co., Cambridge, 39, Mass.
Worcester (Mass.) Pressed Steel Co., 104 Barber Ave.

Steel—Strip, Electro Coated Brass, Copper, Zinc, Tin
Stanley Works, The, New Britain, Conn., Bridgeport, Conn.
Thomas Steel Co., The, Warren, Ohio.

Steel—Strip, Stainless
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Cold Metal Products Co., The, Youngstown, Ohio.
Griffin Mfg. Co., Erie, Pa.
Republic Steel Corp., Cleveland, Ohio.

Steel—Structural
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem (Pa.) Steel Co.
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Columbia Steel Co. (U. S. Steel Corp. Subsidiary), San Francisco, Calif.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Corp., Pittsburgh, Pa.
Republic Steel Corp., Cleveland, Ohio.
Ryerson, Jos. T., & Son, Inc., Chicago, Ill.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Weirton (W. Va.) Steel Co.

Steel—Tool
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Bethlehem (Pa.) Steel Company.
Boker, H., & Co., Inc., 101 Duane St., New York City.
Carpenter Steel Co., The, 121 W. Bern St., Reading, Pa.
Copperweld Steel Co., Warren, Ohio.
Darwin & Milner, Inc., Cleveland.
Disston, Henry, & Sons, Inc., Philadelphia, Pa.
Firth-Sterling Steel Co., McKeesport, Pa.
Ingersoll Steel & Disc Div. Borg-Warner Corp., Chicago.
Jessop, Wm. & Sons, Inc., 627-629 Sixth Ave., N. Y. C.
Jessop Steel Co., Washington, Pa.
Kidd Drawn Steel Co., Aliquippa, Pa.
Kloster Steel Corp., Chicago, Ill.
Latrobe (Pa.) Electric Steel Co.
Midvale Co., The, Nicetown, Phila., Pa.
Milne, A., & Co., 745 Washington St., New York City.
Ryerson, Jos. T., & Son, Inc., Chicago.
Tennessee Coal, Iron & Railroad Co. (U. S. Steel Corp. Subsidiary), Birmingham, Ala.
Vanadium-Alloys Steel Co., Latrobe, Pa.
Wheelock, Lovejoy & Co., Inc., Cambridge, Mass.

Steel Mill Equipment
Pennsylvania Engineering Works, New Castle, Pa.
Pollock, Wm. B., Co., The, Youngstown, Ohio.
Wellman Engineering Co., The, Cleveland.

Stokers
Babcock & Wilcox Co., The, 85 Liberty St., N. Y. C.

Stones—Abrasive-Oil
Bay State Abrasive Products Co., Westboro, Mass.
Carborundum Co., The, Niagara Falls, New York.
Norton Co., Worcester, Mass.

Straightening and Drawing Machines—For Bars
Ajax Mfg. Co., The, Cleveland.

Straightening Machines—Bar & Tube
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Kane & Roach, Inc., Syracuse, N. Y.
Medart Co., The, St. Louis, Mo.
Yoder Co., The, Cleveland, Ohio.

Straightening Machines—Rods
American Foundry Equipment Co., The, 510 S. Byrkit St., Mishawaka, Ind.

Straightening Machines—Wire
Kane & Roach, Inc., Syracuse, N. Y.
Lewis Machine Co., The, 3455 E. 76th St., Cleveland, Ohio.
Shuster, F. B., Co., The, New Haven, Conn.

Structural Iron and Steel Work
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Bethlehem (Pa.) Steel Company.
Emerson-Scheuring Tank Co., 2073 Martindale Ave., Indianapolis, Ind.
General American Transportation Corporation, Plate & Welding Div., Sharon, Pa.
Levinson Steel Co., The, Pittsburgh, Pa.
McCoy Iron Works, Utica, N. Y.
Mahon, R. C., Co., Detroit, Mich.
Morgan Engineering Co., The, Alliance, O.
New York Engineering Co., 75 West St., New York City.
Pollock, Wm. B., Co., The, Youngstown, Ohio.

Swaging Machines
Etna Machine Co., The, Toledo, Ohio.
Torrington (Conn.) Company.

Switches—Electric
Adam, Frank Electric Co., St. Louis, Mo.
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Bull Dog Electric Products Co., Detroit, Mich.
General Electric Co., Schenectady, New York.
Westinghouse Elec. & Mfg. Co., East Pitgh.

Tables—Hydraulic Elevating
Lyon-Raymond Corporation, 157 Madison St., Greene, New York.

Tachometers
Coats Machine Tool Co., Inc., Scarsdale, New York.

Tank Linings
Cellcote Co., The, Cleveland, Ohio.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.
National Carbon Co., Inc., Carbon Sales Div., Cleveland, Ohio.
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

PRODUCTS INDEX

Tanks—Iron and Steel
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
General American Transportation Corporation, Plate & Welding Div., Sharon, Pa.
Koppers Co., Bartlett Hayward Div., Baltimore, Md.
Levinson Steel Co., The, Pittsburgh, Pa.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Newark (N. J.) Oxwelding Co., Inc.

Tanks—Pickling
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
General American Transportation Corporation, Plate & Welding Div., Sharon, Pa.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.
Nukem Products Corp., 68 Niagara St., Buffalo, N. Y.
Pennsylvania Salt Mfg. Co., Philadelphia, Pa.

Tanks—Rubber Lined
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Manhattan Rubber Mfg. Div. of Raybestos - Manhattan, Inc., The, 2 Towsend St., Passaic, N. J.

Tantalum Carbide
Vascoloy-Ramet Corp., North Chicago, Ill.

Tapping Machines
Baker Brothers, Inc., Toledo, Ohio.
Baush Machine Tool Co., Springfield, Mass.
Greenlee Bros. & Co., Rockford, Ill.
Rickert-Shafer Co., The, Erie, Pa.
Waterbury (Conn.) Farrel Fdry. & Mch. Co.

Taps—Collapsing
Geometric Tool Co., The, New Haven, Conn.
Landis Mch. Co., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.
National Acme Co., The, Cleveland.
Rickert-Shafer Co., The, Erie, Pa.

Taps and Dies
Detroit (Mich.) Tap & Tool Co.
Greenfield (Mass.) Tap & Die Corp.
Landis Mch. Co., Waynesboro, Pa.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pratt & Whitney Div. Niles-Bement-Pond Co., West Hartford, Conn.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio.

Terminals—Plain & Lock
Shakeproof, Inc., 2525 N. Keeler Ave., Chicago.

Testing Machines—Coil Spring
Coats Machine Tool Co., Inc., Scarsdale, New York.

Testing Machines—Hardness
Shore Instrument & Mfg. Co., Inc., The, Jamaica, L. I., N. Y.

Testing Machines—Materials
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.

Testing Machines—Spring
Instrument Specialties Co., Little Falls, N. J.

Thermometers
Brown Instrument Co., The, Philadelphia, Pa.
Leeds & Northrup Co., 4956 Stenton Ave., Philadelphia.

Thread Cutting Tools—See Dies, Taps

Thread Rolling Machines
Nilson, A. H., Mach. Co., Bridgeport, Ct.
Waterbury (Ct.) Farrel Fdry. & Mch Co., The.

Threaded Specialties
Oliver Iron & Steel Corp., 10th & Muriel Sts., Pittsburgh, Pa.

Threading Machines
Eastern Machine Screw Corp., New Haven, Conn.
Geometric Tool Co., The, New Haven, Conn.
Landis Mch. Co., Waynesboro, Pa.
Murchey Machine & Tool Co., Detroit.
Peerless Machine Co., 1613 Junction Ave., Racine, Wis.
Rickert-Shafer Co., The, Erie, Pa.

Threads—Ground
Hartford (Conn.) Special Machinery Co., The.
Precision Thread Grinding Co., Detroit, Mich.

Tie Plates
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.

Tin & Terne Plate
Carnegie-Illinois Steel Corp. (U. S. Steel Corp. Subsidiary), Pittsburgh & Chicago.
Inland Steel Co., Chicago.
Jones & Laughlin Steel Corp., Pittsburgh.
Republic Steel Corp., Cleveland, Ohio.
Weirton (W. Va.) Steel Co.
Wheeling (W. Va.) Steel Corp.
Youngstown (Ohio) Sheet & Tube Co., The.

Tin Plate Machinery
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Wean Engineering Co., Inc., The, Warren, Ohio.

Tips—Spot Welding
Mallory, P. R., & Co., Inc., Indianapolis, Ind.

Titanium Metal & Alloys
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Tongs—Automatic
Heppenstall Co., Pittsburgh.

Tool Bits
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.
Crobalt Company, Inc., Ann Arbor, Mich.
Empire Tool Co., 8788 Grinnell Ave., Detroit, Mich.
Gairing Tool Co., The, Detroit.
General Tool & Die Corp., 555 Prospect St., East Orange, N. J.
Genesee Tool Co., Fenton, Mich.
Gisholt Machine Co., Madison, Wisconsin.

Tool Bits—Tipped
Carboloy Co., Inc., 11153 East 8-Mile Rd., Detroit, Mich.
Gairing Tool Co., The, Detroit, Mich.
General Tool & Die Corp., 555 Prospect St., East Orange, N. J.
Genesee Tool Co., Fenton, Mich.
McKenna Metals Co., Latrobe, Pa.
Tungsten Electric Co., 571 39th St., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.

Tool Holders
Armstrong Bros. Tool Co., Chicago.
Empire Tool Co., 8788 Grinnell Ave., Detroit, Mich.
Gairing Tool Co., The, Detroit.
Gisholt Machine Co., Madison, Wisconsin.
Jones & Lamson Machine Co., Springfield, Vt.
Williams, J. H., & Co., Buffalo, N. Y.

Tools, Diamond—Boring & Radius
Smit, J. K., & Sons, Inc., 157 Chambers St., New York City.

Tools—Turning, Boring & Facing
Armstrong Bros. Tool Co., Chicago.
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.
Crobalt Company, Inc., Ann Arbor, Mich.
Empire Tool Co., 8788 Grinnell Ave., Detroit, Mich.
Gairing Tool Co., The, Detroit, Mich.
General Tool & Die Corp., 555 Prospect St., East Orange, N. J.
Genesee Tool Co., Fenton, Mich.
Gisholt Machine Co., Madison, Wisconsin.
Jones & Lamson Machine Co., Springfield, Vt.
McKenna Metals Co., Latrobe, Pa.
Tungsten Electric Co., 571 39th St., Union City, N. J.
Vascoloy-Ramet Corp., North Chicago, Ill.

Torches—Brazing, Cutting and Welding
Air Reduction, 60 East 42nd St., N. Y. C.
Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
National Cylinder Gas Co., Chicago, Ill.
Rail Supply Co., 110 E. 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit, Mich.

Trailers
Lyon-Raymond Corporation, 157 Madison St., Greene, New York.

Tramrails—Overhead Systems
Alvey-Ferguson Co., The, 711 Disney St., Cincinnati, Ohio.
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., 1115 East 283rd St., Wickliffe, Ohio.
Harnischfeger Corp., 4401 W. National Ave., Milwaukee.

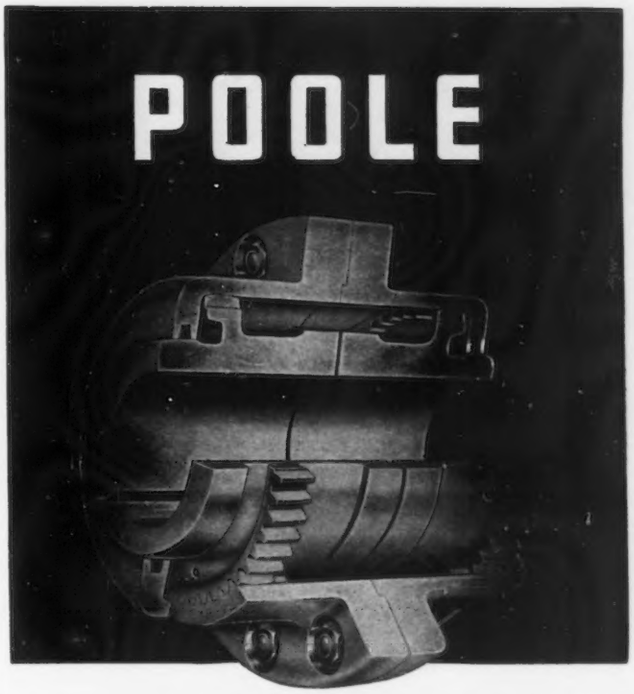
Tramways—Wire Rope
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary), Cleveland, Ohio.
Macwhyte Co., Kenosha, Wisc.
Roebling's, John A., Sons Co., Trenton, New Jersey.

Transcribing Machines
Dictaphone Corp., 420 Lexington Ave., New York City.

Transformers—Electric
Allis-Chalmers Mfg. Co., Milwaukee, Wis.

Transmissions—Hydraulic
American Engineering Co., Philadelphia.
Sundstrand Machine Tool Co., Rockford, Ill.
Vickers, Inc., 1420 Oakman Blvd., Detroit, Mich.

Transmissions—Variable Speed
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Continental Machines, Inc., 1311 S. Washington Ave., Minneapolis, Minn.
Link-Belt Co., 2045 West Hunting Park Ave., Phila., Pa.
Reeves Pulley Co., Columbus, Indiana.



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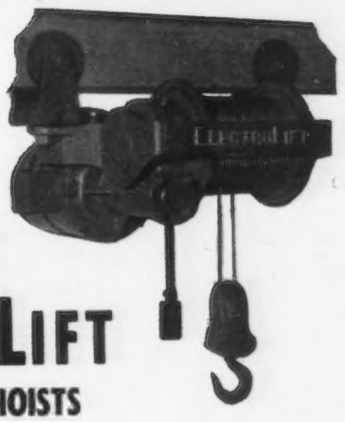

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PRODUCTS INDEX

Traps—Steam
Crane Co., Chicago, Ill.
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.

Treads—Safety
Blaw-Knox Div. of Blaw-Knox Co., Blawnox, Pa.
Borden Metal Products Co., Elizabeth, N. J.
Hendrick Mfg. Co., Carbondale, Pa.
Norton Co., Worcester, Mass.

Trolleys
Cleveland Tramrail Div. of The Cleveland Crane & Engng. Co., 1115 East 283rd St., Wickliffe, Ohio.
Curtis Pneumatic Mchry. Div. of Curtis Mfg. Co., 1948 Kienlen Ave., St. Louis, Mo.
Ford Chain Block Div. American Chain & Cable Co., Inc., Philadelphia, Pa.

Trucks—Dump, Industrial
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Towmotor Co., 1225K Woodrow Wilson Ave., Detroit, Mich

Trucks—Hand
Mercury Mfg. Co., 4144 S. Halsted St., Chicago, Ill.
Standard Pressed Steel Co., Jenkintown, Pa.

Trucks—Lift
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Automatic Transportation Co., 75 W. 87th St., Chicago, Ill.
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland, Ohio.
Elwell-Parker Electric Co., The, Cleveland, Ohio.
Lyon-Raymond Corporation, 157 Madison St., Greene, New York.
Mercury Mfg. Co., 4144 S. Halsted St., Chicago, Ill.
Towmotor Co., 1225K Woodrow Wilson Ave., Detroit, Mich.

Trucks & Tractors—Electric Industrial
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Automatic Transportation Co., 75 W. 87th St., Chicago, Ill.
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland, Ohio.
Elwell-Parker Electric Co., The, Cleveland, Ohio.
Mercury Mfg. Co., 4144 S. Halsted St., Chicago, Ill.
Towmotor Co., 1225K Woodrow Wilson Ave., Detroit, Mich

Trucks & Tractors—Gasoline & Diesel
Silent Hoist Winch & Crane Co., 851-63rd St., Brooklyn, N. Y.

Trucks & Tractors—Gasoline Industrial
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Baker-Raulang Co., The, 2175 W. 25th St., Cleveland, Ohio.
Mercury Mfg. Co., 4144 S. Halsted St., Chicago, Ill.
Towmotor Co., 1225K Woodrow Wilson Ave., Detroit, Mich

Tube Mill Machinery
Aetna-Standard Engineering Co., The, Youngstown, Ohio.
Continental Roll & Steel Fdry. Co., East Chicago, Ind.
Taylor-Wilson Mfg. Co., 25 Thomson St., McKees Rocks, Pa
United Engineering & Fdry. Co., Ptgh.
Waterbury (Conn.) Farrel Foundry & Machine Co., The.

Tube Mill Machinery—Welded
Continental Roll & Steel Fdry. Co., East Chicago, Ind.
McKay Machine Co., The, Youngstown, Ohio.

Tubes—Boiler
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

Tubes—Brass, Copper, Bronze, Nickel Silver
American Brass Co., The, Waterbury, Conn.
Bridgeport (Conn.) Brass Co.
Lewin-Mathes Co., St. Louis, Mo.
Phosphor Bronze Smelting Co., The, Phila., Pa.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.

Tubes—Heat Exchanger
Steel & Tubes Div. of Republic Steel Corp., Cleveland, Ohio.

Tubes—High Carbon
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

Tubes—Stainless Steel
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Pittsburgh (Pa.) Steel Co.
Ryerson, Jos., T., & Son, Inc., Chicago.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

Tubing—Aluminum Seamless
Aluminum Co. of America, Pittsburgh.

Tubing—Copper Coated or Tinned Steel
Bundy Tubing Co., Detroit, Mich.

Tubing—Magnesium Alloys
American Magnesium Corp., 1701 Gulf Bldg., Pittsburgh.
Dow Chemical Co., The, 921 Jefferson Ave., Midland, Mich.

Tubing—Monel
Bundy Tubing Co., Detroit, Mich.
International Nickel Co., Inc., 67 Wall St., New York City.

Tubing—Open Seam
Steel & Tubes Div. of Republic Steel Corp., Cleveland.

Tubing—Seamless Steel
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Frasse, Peter A., & Co., Inc., 17 Grand St., New York City.
Jones & Laughlin Steel Corp., Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ohio Seamless Tube Co., The, Shelby, Ohio.
Pittsburgh (Pa.) Steel Co.
Ryerson, Jos. T., & Son, Inc., Chicago.
Timken Roller Bearing Co., The, Canton, O.
Timken Steel & Tube Div., The Timken Roller Bearing Co., Canton, O.
Youngstown (Ohio) Sheet & Tube Co., The.

Tubing—Square and Rectangular
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Standard Tube Co., The, Detroit, Mich.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Tubular Service Corp., 120—44th St., Brooklyn, N. Y.

Tubing—Welded Steel
Allegheny Ludlum Steel Corp., Pittsburgh, Pa.
Bundy Tubing Co., Detroit, Mich.
Jones & Laughlin Steel Corp. Pittsburgh.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Ohio Seamless Tube Co., The, Shelby, Ohio.
Standard Tube Co., The, Detroit, Mich.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Youngstown (Ohio) Sheet & Tube Co., The.

Tubular Products
Bundy Tubing Co., Detroit, Mich.
Flori Pipe Co., The, St. Louis, Mo.
National Tube Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Steel & Tubes Div. of Republic Steel Corp., Cleveland.
Swan Engineering Co., Inc., Newark, N. J.

Tumbling Barrels — See Barrels — Burnishing & Tumbling

Tungsten Carbide
Carboloy Co., Inc., 11153 East 8-Mile Road, Detroit.
Firth-Sterling Steel Co., McKeesport, Pa.
Tungsten Electric Co., 571 39th St., Union City, N. J.

Tungsten Metal & Alloys
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Mallory P. R., & Co., Inc., Indianapolis, Ind.

Turbine-Generators—Steam
Allis-Chalmers Mfg. Co., Milwaukee, Wis.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Turbo-Compressors
Spencer Turbine Co., The, Hartford, Conn.

Turntables
American Bridge Co. (U. S. Steel Corp. Subsidiary), Pittsburgh.
Atlas Car & Mfg. Co., The, Cleveland, Ohio.
Hill Acme Co., The, Canton Div., 6400 Breakwater Ave., Cleveland, Ohio.
Whiting Corp., 15601 Lathrop Ave., Harvey, Ill.

Twist Drills
Cleveland (Ohio) Twist Drill Co., The.
Greenfield (Mass.) Tap & Die Corp.
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Standard Tool Co., The, 6918 Central Ave., Cleveland, Ohio.
Union Twist Drill Co., Athol, Mass.

Valves—Air Blast for Presses
Logansport (Ind.) Machine, Inc.

PRODUCTS INDEX

Valves—Air & Hydraulic Control
Brown Instrument Co., The, Philadelphia, Pa.
Crane Co., Chicago, Ill.
Hannifin Mfg. Co., Chicago, Ill.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Logansport (Ind.) Machine, Inc.
Nicholson, W. H., & Co., 165 Oregon St., Wilkes-Barre, Pa.
Tomkins-Johnson Co., The, Jackson, Mich.

Valves—Butterfly
R-S Products Corp., Philadelphia, Pa.

Valves—Carbon
National Carbon Co., Inc., Carbon Sales Div., Cleveland, Ohio.

Valves—Hydraulic
Baldwin-Southwark Div. Baldwin Locomotive Wks., Philadelphia.
Bayard, M. L., & Co., Inc., Philadelphia, Pa.
Birdsboro (Pa.) Steel Foundry & Machine Co.
Crane Co., Chicago.
Denison Engineering Co., The, 1160 Dublin Rd., Columbus, Ohio.
Farquhar, A. B., Co., Ltd., York, Pa.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Logemann Bros. Co., Milwaukee, Wis.
Racine (Wis.) Tool & Machine Co.
Vickers, Inc., 1420 Oakman Blvd., Detroit, Mich.
Watson-Stillman Co., The, 103 Aldene Road, Roselle, N. J.
Wood, R. D., & Co., Philadelphia, Pa.

Valves—Iron, Steel & Brass
Acme Valve & Fittings Corp., Chicago, Ill.
Crane Co., Chicago.
Homestead Valve Mfg. Co., Coraopolis, Pa.
Jarecki Mfg. Co., Erie, Pa.
North American Mfg. Co., The, Cleveland, Ohio.
Wood, R. D., & Co., Philadelphia, Pa.

Valves—Lead
National Lead Co, 111 Bway., N. Y. C.

Vanadium
Electro Metallurgical Sales Corp., 30 E. 42nd St., N. Y. C.
Vanadium Corp. of America, 420 Lexington Ave., New York City.

Vibrators
Milwaukee (Wis.) Foundry Equipment Co.

Vises
Cincinnati (Ohio) Milling Mch. Co., The.
Jarecki Mfg. Co., Erie, Pa.
North Bros. Mfg. Co., Philadelphia, Pa.

Vises—Machine
Hendey Machine Co., Torrington, Conn.
Ross, David J., Co., Benton Harbor, Mich.
Sheldon Machine Co., Inc., Chicago, Ill.

Washers—Iron or Steel
Beall Tool Co., Div. Hubbard & Co., East Alton, Ill.
Guarantee Specialty Mfg. Co., Cleveland, Ohio.
Keystone Bolt & Nut Corp., 60-62 Murray St., N. Y. C.
Nicetown Plate Washer Co., Inc., Philadelphia.
Oliver Iron & Steel Corp., 10th & Muriel Sts., Pittsburgh, Pa.
Sessions, J. H., & Son, Hooker Court, Bristol, Conn.
Shakeproof, Inc., 2525 N. Keeler Ave., Chicago.
Smith, Thomas, Co., Worcester, Mass.

Washers—Leather
Chicago (Ill.) Rawhide Mfg. Co., The, 1306 Elston Ave.
Garlock Packing Co., The, Palmyra, New York.
Schieren, Chas. A., Co., 30 Ferry St., N. Y. C.

Washers—Lock
Beall Tool Co. Div. Hubbard & Co., East Alton, Ill.
Harper, H. M., Co., The, 2607 Fletcher St., Chicago, Ill.
National Lock Washer Co., Newark, N. J.
Shakeproof, Inc., 2525 N. Keeler Ave., Chicago.

Washers—Spring
Beall Tool Co. Div. Hubbard & Co., East Alton, Ill.
Harper, H. M., Co., The, 2607 Fletcher St., Chicago, Ill.
Hubbard, M. D., Spring Co., 330 Central Ave., Pontiac, Mich.
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Shakeproof, Inc., 2525 N. Keeler Ave., Chicago.

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General American Transportation Corporation, Plate & Welding Div., Sharon, Pa.
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Linde Air Products Company, The, 30 East 42nd St., N. Y. C.
National Cylinder Gas Co., Chicago, Ill.
Rall Supply Co., 110 E. 42nd St., N. Y. C.
Weldit Acetylene Co., Detroit, Mich.

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Wilson Welder & Metals Co., Inc., 60 East 42nd St., N. Y. C.

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Pittsburgh (Pa.) Steel Co.
Revere Copper & Brass, Inc., 230 Park Ave., New York City.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Titan Metal Mfg. Co., Bellefonte, Pa.
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Wickwire Spencer Steel Co., 500 Fifth Ave., N. Y. C.
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Page Steel & Wire Div. American Chain & Cable Co., Inc., Monessen, Pa.
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Roebling's, John A., Sons Co., Trenton, N. J.
Seneca Wire & Mfg. Co., The, Fostoria, Ohio.
Wickwire Brothers, Inc., Cortland, N. Y.
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Keystone Steel & Wire Co., Peoria, Ill.
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3695 E. 78th St. Cleveland, Ohio

SPECIAL MACHINERY AND CONTRACT MACHINE WORK
Torrington service includes all essentials of machinery design and construction: specialized engineering and designing staff—pattern shop—forge shop—heat treating equipment—machine shop completely equipped—large assembly floor covered by cranes.
THE TORRINGTON MANUFACTURING CO., Torrington, Conn.

WANTED
SUB-CONTRACT WORK FOR ALUMINUM ALLOY SAND CASTINGS
1 oz. — 50 lbs.
Complete Pattern Shop
BOOSE ALUMINUM FOUNDRY CO.
Reamstown, Pa.

SPECIAL MACHINERY
built to order

GEARS of every description cut to order
GEAR, CAM & THREAD grinding
AERONAUTICAL PARTS on contract basis

Send blue prints for estimate
THE HARTFORD SPECIAL MCHRY. CO.
Hartford, Connecticut

CASTINGS
Commercial Casting Division
of
Ohio Stove Company
Portsmouth, Ohio

has open facilities for manufacture of plain or cored gray iron, white iron or semi-steel castings. May we quote your requirements.

ELECTRIC STEEL CASTINGS
¼ to 4000 lbs. in weight
THE HARTFORD ELECTRIC STEEL CORPORATION
540 Flatbush Ave., Hartford, Conn.

SPECIAL MACHINERY
DIAMITE *Abrasive Resistant* Castings
NI-RESIST *Heat & Corrosion Resistant* Castings
P M G BRONZE *High Strength Acid Resistant* Castings
Fully Equipped Pattern Foundry & Machine Shop Facilities—Castings to 15 tons.
Weatherly Foundry & Mfg. Co., Weatherly, Pa.

Contract Machine Work
Parts and Complete Machines, Heat Treating and Grinding. Mail Blue Prints for Quotations.
GENERAL MACHINE WORKS
York, Pa.

Gray Iron and Semi Steel Castings, also alloyed with nickel, chrome, and molybdenum. Wood, Iron, Brass and Aluminum pattern work.
KING FOUNDRIES, INC.
Phone 823 North Wales, Montg. Co., Pa.
22 Miles from Philadelphia, Pennsylvania

TOOLS, DIES, JIGS, FIXTURES
SPECIAL MACHINERY
ALSO
MACHINE SHOP FACILITIES FOR SMALL LOT PRODUCTION WORK
DURABILT TOOL & MFG. CORPORATION
9-17 37 Ave., Long Island City, N. Y.

Special Washers
We carry in stock Silicon killed Steel specially suited for case-hardening. Stock dies for producing washers from .0015 to ½" thick.
Thomas Smith Company
294 Grove St., Worcester, Mass.

CONTRACT THREAD GRINDING
Production and Toolroom Work
Send blueprint of your part for prompt quotation
PRECISION THREAD GRINDING COMPANY
6651 Tireman Ave. Detroit, Mich.

SUB-CONTRACTING

RESISTANCE WELDERS — SPOT AND BUTT
SHEET METAL FORMING
WIRE FORMS AND ASSEMBLIES

P L A T I N G

copper—nickel— **CADMIUM—ZINC** *—chrome—silver*

Baked Enameling and Finishing

CROWN PRODUCTS COMPANY

3400-3500 Newton Ave. Indianapolis, Indiana

Cherry 7770

KIRK & BLUM

CONTRACT MANUFACTURING
ACCURATE SHEET STEEL
STAINLESS, STEEL, MONEL OR
OTHER ALLOY FABRICATION
OUR SPECIALTY
CAPACITY 3/8" AND LIGHTER

THE KIRK & BLUM MFG. CO.
2821 SPRING GROVE AVE. CINCINNATI, OHIO

AN IMPORTANT NOTICE

We have equipment at hand for the working of hot rolled sheets and plates as well as the alloy metals. Our facilities are ready to undertake the fabrication of Tanks, Vulcanizers, Retorts, Salt Baths, Annealing Furnaces, Oil Quench Units and Machine Bases.

We solicit your inquiries now. Send us your drawings and they will receive our immediate attention.

NEWARK OXWELDING COMPANY, INC.

91-93 Poinier Street Newark, New Jersey

—HOT LEAD COATING—

- Complete Plating Services • All Metals
- Unlimited Production Capacity for Wartime Jobs
- Storage and Direct Shipping Facilities
- Complete Laboratory and Engineering Service
- Government and S.A.E. Specifications Guaranteed

united platers, inc.
989 Madison, Detroit, Michigan
Telephone: RAndolph 4050 for rush quotation

WANTED

SUB-CONTRACTS for light and medium Structural Steel work, welded machine bases, frames, trusses, pedestals, beam & column work, railings, light forgings, light plate, and heavy sheet fabrication. We solicit your inquiries.

McCoy Iron Works
Utica, N. Y.

ELECTROPLATING DEFENSE WORK WANTED

Largest Job Platers in New England

A. A. BRUNELL ELECTROPLATING CORP.
370 Park Ave., Worcester, Mass.

Rolling space available

on 10" Mill for rerolling billets into rounds or squares, ½" to 1½" diameters, also flats 1" to 4" wide. Prompt deliveries and attractive prices.

NICETOWN PLATE WASHER COMPANY, INC
Philadelphia, Penna.

The preceding seven pages afford an excellent opportunity for companies seeking sub-contract work to announce their facilities to the metal-working firms that are placing war work. Many companies are taking advantage of this low-cost opportunity.

Over 100,000 men read The Iron Age, and they are mostly key men in this country's largest industry—the metal-working industry. If you are interested in advertising in this Sub-Contracting Section which is published in the first and third issues each month, write to The Iron Age for rates.

THE CLEARING HOUSE

CONSIDER GOOD USED EQUIPMENT FIRST

IMMEDIATE AVAILABILITY AND DELIVERY ARE IMPORTANT FACTORS
PARTIAL LIST — NUMEROUS OTHER MACHINES ALSO AVAILABLE

AIR COMPRESSOR

694 cu. ft. Sullivan Air Compressor Class WJ-3 16"x9¾"x10". With Motor and 42"x10' Vertical Air Receiver

BORING MILL—HORIZONTAL

Niles Cylinder Boring Mill. 1—6" and 1—10" Main Boring Bar. 1—2⅞" and 1—3⅝" Bar for the side heads

BUILDINGS

45'x130' Corrugated Steel Building with 10 ton Whiting OET Crane
50'x100' Structural Steel Building with 10 ton OET Crane
2—50'x200' Steel Buildings with 2—5 ton OET P&H Cranes—50' span
52'x580' Steel Building. Complete with 10 ton and 2—15 ton P&H OET Cranes
60'x150' Structural Steel Building with 20' and 12' leanto. Complete with one 5 ton OET Crane

BULLDOZERS

#3 Williams & White, Arr. for Pulley Dr. Face of crosshead 7"x39". Movement of crosshead 16"
#4 Williams & White, belt driven. Face of crosshead 7½"x45". Movement of crosshead 18"

CRANES—OVERHEAD ELECTRIC TRAVELING

2½ ton Euclid	17'8¾" Span	230/3/60 A.C.
3 ton P & H	16'9"	Span 220 Volt D.C.
3 ton Shepard	35'4"	Span 110 Volt D.C.
5 ton Morgan	70'	Span 220 Volt D.C.
10 ton PRMCO	110'	Span 440/3/60 A.C.
15 ton Cleveland	35'4"	Span 220 Volt D.C.
15 ton Alfred Box	25'	Span 110 Volt D.C.
20 ton P & H	47'	Span 550/3/60 Motors
20 ton P & H	34'6"	Span 220 Volt D.C.
50 ton J. & L.	16'	Span 220 Volt D.C.

CRANE—BUCKET

#75 Lorain Bucket Crane, 60" Boom, with Gasoline Motor and Clam Shell Bucket

CRANES—GANTRY

10 ton McMyler 42' span. 4½' Overhand each end. Motors 220/3/60 A.C.
10 ton Lidgerwood 135' span Motors 220/3/60 A.C.

CRANES—HAND OPERATED

4 ton	25'6" Span	
4 ton	41' Span	Including 100' Runway
5 ton	20' Span	
8 ton Whiting	28' Span	Including 100' Outdoor Runway
15 ton Whiting	35' Span	
20 ton Whiting	42' Span	
30 ton Whiting	56" Span	(Two Hoists)

CRANE MOTORS

20 HP Size AW—9 P&H Hoist Motor, 1200 RPM. 220/3/60 A.C. Drum Controller.
30 HP Size AW—10 P&H Bridge Motor, 1200 RPM. 220/3/60 A.C. Drum Controller

CRANE—RUNWAY

271'10" "A" Frame Runway, designed to carry 30 ton Crane load
228' "A" Frame Runway, designed to carry 30 ton Crane load approx.
120' "A" Frame Runway, designed to carry 30 ton Crane load approx.

CRANE—TROLLEY

10 ton Cleveland Trolley, with 2—220/3/60 General Electric Motors. Gauge of Trolley wheels—4'8½"

CUTTING OFF MACHINES

8" Standard Engr. Co. Cutting Off Machine, M.D.
10" Standard Engr. Co. Cutting Off Machine, M.D.

FORGING MACHINES

¾" to 6" Ajax, National, Steel Frame

FURNACES

2500# Electric Furnace Company Annealing Furnace. Complete with loader and controller
300# Rockwell Rivet Annealing Gas Fired Furnace. Furnace Body 3'9" wide x 6'9" long
40-60 lb. Moore Size "W" Electric Melting Furnace
750 lb. Detroit Type "A" Melting Furnace

16' PYRAMID TYPE PLATE BENDING ROLL

Capacity 1" Plate full width
Top Roll 21" Diameter
Bottom Rolls 16½" Diameter
Drop End Housing
Motor Driven

10' NILES PLATE STRAIGHTENING ROLL

Seven 10" Diameter Rolls
Belt Driven
Approximate Capacity ⅝" Full Width

#8 WILLIAMS & WHITE BULLDOZER

Arranged for Motor Drive
Stroke — 24"
Die Space — 60"
Face of Crosshead — 16" x 72"

#3 RYERSON FRICTION SAW

52" Blade
Hand and Power Feed
Complete with
45/90 H.P. 230 Volt D.C. Motor
and
1 H.P. 230 Volt D.C. Motor

GEAR REDUCTION UNIT

300 HP Falk Gear Reduction with 300 HP. 2200 Volt 3 phase, 60 cycle General Electric Slip-Ring Motor.

GENERATING SETS

135 KW Gen. Elect. 250 volt DC Generator with direct connected 200 HP De La Vergne Engine
312 KVA Westinghouse 2300/3/60 Generator with 18"x30" Corliss Engine
100 KW Crocker-Wheeler 250 volt DC Generator with 26"x30" Mesta Uniflow High Speed Automatic Steam Engine

HAMMERS—STEAM DROP

1000# Chambersburg
1000# Erie
1250# Chambersburg
1500# Alliance, Three "V" Slides
2000# Morgan

HAMMERS—STEAM FORGING

650# Chambersburg—Double Frame
1000# Chambersburg—Double Frame
1100# Bement Miles—Single Frame
1100# Chambersburg—Single Frame
1100# Erie Single Frame
10,000# Niles-Bement-Pond—Double Frame

HOT METAL MIXER

250 ton. Complete with rocker bed, cylinders, trunnion, bearings, etc. Riveted throughout

INGOT ROTATOR

Johnston & Jennings Ingot Rotator. Motor Driven with 20 H.P. 860 R.P.M. Motor

LATHE

Allis-Chalmers Two Bar Gun Boring Lathe. Arranged for Motor Drive. Maximum capacity 12" dia. hole thru 24" dia. shaft — 40' long. Diameter hole thru spindle 26". Spindle bearing 29" dia.

LEVELLER—ROLLER

75" Torrington Roller Leveller 19 Rolls, 2" Diameter. Motor Driven. Caapcity .060 Gauge. (Practically New)

NIBBLER

#5 Gray Machine Company Turret Head Metal Cutter. 36" Throat. ⅛" cap. With 1½ H.P. 220/3/60 motor

PRESSES—HYDRAULIC

10,000 lb. Chambersburg Self-contained Press. 28"x20" Between Columns. 14" Stroke. With Pump and Motor
600 ton Southwark Four Column Press 31" x 31" Between Columns, 18" Stroke. Complete with Pump and Motor

PRESSES—MISCELLANEOUS

#6 Bliss Horizontal Reducing Press, B.D. Stroke 8". Width of Bed 26"
#60½ Bliss Reducing Press. Belt Driven. Stroke 4" to 42". 16⅛" Bet. Gibs
#D45 Ferracute Press. Horizontal Double End, Screw Type, 36" Ram Stroke
#856 Toledo Rack & Pinion Press, B.D. Stroke 5" to 36"

PUMP—VERTICAL TRIPLEX

5x6 Deming Horizontal Single Acting Triplex Pump. Cap. 91 G.P.M., at 150# pres. With 10 H.P. 3 ph. 60 cycle A.C. Motor

PUNCHES—HORIZONTAL

#2 Hilles & Jones Horizontal Punch. Capacity 1" thru 1"

PUNCH—MULTIPLE

#E Long & Allstatter Double Crank Multiple Punch. T&L. Pulley Drive. 114" Between Housings. 340 tons

PUNCH & SHEAR COMBINATIONS

No. 2 Hilles & Jones Double End Punch & Shear, M.D. 22" throat. Cap. to punch 1" thru 1", shear 6"x1"
No. 6 Hilles & Jones Punch & Shear, 54" Throat. Cap. to punch 2½" thru 1⅛", shear plate 1¼" thick
Long & Allstatter, Double End Punch & Shear, 12" throat. Cap. to punch 1" thru 1", shear ⅞"x1¾". Attachments
Size "B" Long & Allstatter Single End Punch, 30" throat. Cap. to punch 2¼" thru 1¼"
Style F Niles-Bement-Pond Single End Punch, Arranged for motor drive, 18" Throat. Capacity 3" thru 2"
Rocker River Single End Punch, 48" Throat. Capacity 1⅛" thru 1". Arr. M.D.

ROLLING MILLS

10"x12" United E & F Co. Single Stand Two High
10"x16" United E & F Co. Single Stand Two High
12"x20" Philadelphia Roll & Machinery Co. Single Stand—Two High
14"x19" Waterbury Farrel Four Stand 2 High
30"—3 High Sheet Bar Mill
14" Lewis Belgian Rolling Train. 3 Stand—3 High. Complete with motor

SAW—HOT

48" U.E.&F. Co. Sliding Frame Hot Saw, arr. M.D. Stroke—4'6"

SCALE

4000 lb. Toledo Overhead I-Beam Track. Scale with hand operated chain hoists connected to two 2-ton trolleys. Complete with app. 800' of 8" I-Beam Track

SHEARS—ALLIGATOR

30" United E & F Co. No. 7 Alligator Shear, Motor Driven. Capacity 6½" square or 4"x24" soft cold steel
42" Doelger & Kirsten No. 3½ Alligator Shear, Belt Driven. Capacity 4½" round, 4¼" square

SHEAR—ANGLE

4x4x½" Long & Allstatter Double Angle Shear, Arr. M.D.
8"x8"x1¼" Hilles and Jones No. 5 Double Angle Shear, Geared Motor Drive

SLITTER

48" Yoder Slitter with 10 H.P. Motor and Starter cap. 48" in width, 11 gauge or lighter

SPACING TABLE

136' Thomas Spacing Table. Capacity to handle Plate 60" Wide. Stiffener Angle 6x4, 50" long Angles 8"x8", 24" Beam—Flange Punching 18" Channels—Web Punching, 20" Standard Beams—Web Punching; Complete with attachments necessary for these operations

STACK—BLOOMING MILL

3'x80' Blooming Mill Stack. Made up in 10 ft. sections with 4½" brick lining

STRAIGHTENERS

½", ⅝" Shuster Straightening & cut-off Machines. Belt or Motor Drive
1" Kane & Roach Band Straightening Machine
#5 18½ Littell Single Rack and Pinion Feeding and Straightening Machine, motor driven. Five Straightening rolls 3½" dia. x 18½" long. One set pinch rolls 5½" dia. x 18½" long
#2 Treadwell High Speed Pipe Straightening Machine, motor driven. Cap. ½" to 3½" steel tubing or ½" to 2½" steel bars

Manufacturing RITTERBUSH & COMPANY, INC. Equipment
30 CHURCH ST
NEW YORK CITY

Confidential Certified Appraisals
Liquidations—Bona Fide Auction Sales Arranged

Consulting Engineering Service
Surplus Mfg. Equipment Inventories Purchased

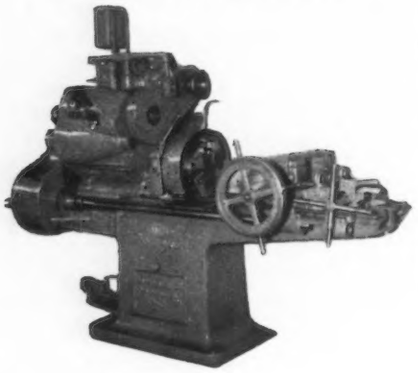
THE CLEARING HOUSE

EMERMAN - CHICAGO

SAWS

1—Type 33 Porter Cable 24" Band Saw
1—No. 15 Simplex Cold Saw
1—C & C Cold Saw
1—26" Newton Cold Saw
1—No. 11 Higley Cold Saw
2—No. 5 Marvel 6" x 6" capac.
1—6" x 6" Peerless Hack Saw
2—No. 5 Mass. Hack Saws
1—6" x 6" Peerless Hack Saw
1—Ajax Burring Saw

BOLT THREADERS

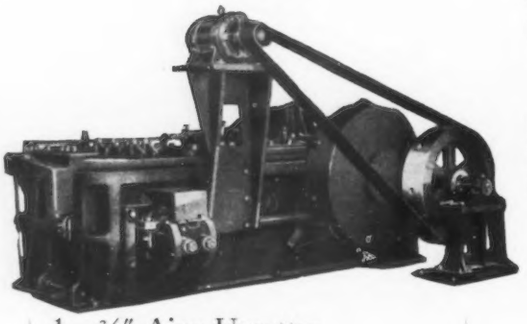


1—4" Landis
1—1½" Acme Threader, Double Head
2—2" Landis Threaders
1—4" Landis Threader, Double Head
1—1½" Acme Double Head
1—No. 2 Kent, 2-spindle
1—1" Standard Threader, Double Head
1—1" Acme Threader, Triple Head
1—1¼" Landis Threader
8—¾" Geometric Threaders
1—¾" Acme Double Head

PIPE THREADERS

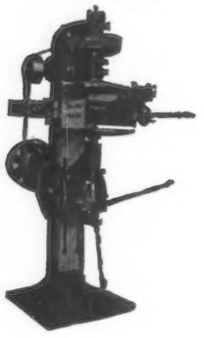
1—2" Oster Threader
1—2" Threader Bignall & Keeler
1—4" Stoever Threader
1—No. 6 Stoever 6" Cap.
1—No. 5 Williams Cutter 12" capacity
1—3" Stover Cutoff
1—4" Stover Threader

UPSETTERS



1—¾" Ajax Upsetter
1—1" Ajax Upsetter
1—3" Ajax Upsetter
1—1½" Ajax Upsetter
1—4" Ajax Upsetter
1—5" Ajax Upsetter
1—6" Ajax Upsetter
1—1" National Upsetter
1—4" National Upsetter
1—5" National Upsetter
2—1½" Acme Upsetter
1—3" Acme Upsetter
2—3½" Acme Upsetter

SEAMERS



1—Stop Lock
1—7" x 43" Quickwork
1—No. 10-A-1 Quickwork
1—Magee, Vert. Turning Machine
1—No. 303 Toledo
2—308 Toledo
2—No. 308H Toledo

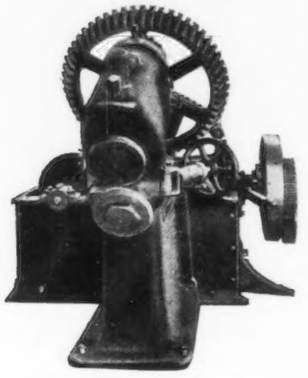
RIVETING HAMMERS

1—No. 4A Rochester
1—No. 16 Penn
8—2A High Speed
1—3A High Speed
10—4A High Speed
2—5A High Speed
1—5½B High Speed
1—No. 6B High Speed

FLANGERS

1—10½' Flanging Clamp
1—Yoder Bldg. End
1—MacCabe ½" x 6"

SHEARS



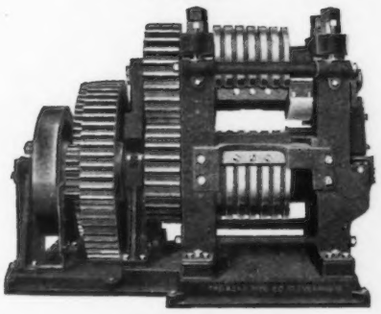
6—No. 3 Whitney, Slitting
2—No. 6 Whitney, Slitting
1—No. 16A Niagara, Circle
1—No. 387A Toledo, Circle
1—No. 1, 6" cap. Carlin, Alligator
1—42" Lamb & Nash Rotary Gang Slitter
1—No. 4 Cleveland, Guillotine
1—No. 1 Hilles & Jones, Guillotine
1—No. 2 Hilles & Jones, Guillotine
1—¾" Marshalltown, Rotary Bevel
1—¾" Lennox, Rotary Bevel
1—No. 1 Lennox, Rotary Bevel
1—30" Pettingell, Rotary
1—Quickwork Universal
1—No. 455 Whitney
1—No. 5 Victoria
1—No. 6 Whitney
1—No. 2 Long & Allstatter, Shear & Punch
1—B50 Unishear
1—6" x 6" x ¾" Pels Double Angle
1—No. 3 Lennox Rotary Bevel
4—No. 8A Quickwork

LOUIS E. EMERMAN & CO.
CHICAGO, ILL.

THE CLEARING HOUSE

EMERMAN - CHICAGO

ROLLS



1—No. 2 Hilles & Jones
1—No. 1 Hilles & Jones, Bending
1—No. 1 Williams & White, Forg.
1—No. 1A Ajax, Forging Taper
2—1½A Ajax, Forging
1—No. 2 Ajax, Forging Taper
1—No. 000 Hilles & Jones Straightener
1—Tishken Strip Straightener and Cutoff
1—Corrugating Roll
1—9 Stand Roll, Forming
1—No. 110 Kane & Roach Coiler
1—No. 2B Sutton Roller Leveller
1—48" McKay Levelling Roll

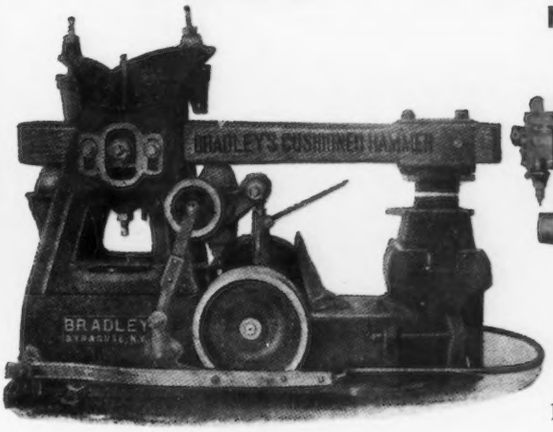
HEADERS

1¼"—Waterbury Farrel No. 11

PUNCHES

3—No. 17 Whitney, Hand
1—No. 13 Niagara, Hand
1—No. 20 Whitney, Hand
1—No. 5A New Doty, Hand
2—No. 2 Hilles & Jones, Dble. End
1—No. 2 Long & Allstatter, Dble. End
1—No. 5 Long & Allstatter, Dble. End
1—Cleveland 1"x1", Dble. End
1—Camden, Dble. End
1—Camden, Horiz. & Vert. Dble. End
1—Cleveland, Horiz.
1—No. 4 Long & Allstatter, Horiz.
1—No. 2 Hilles & Jones Horiz.
1—10L Rock River, Single End
1—No. 5 Long & Allstatter, Single End
1—Style E. Long & Allstatter, Single End
1—No. 6 Hilles & Jones, Single End
1—Style C Cleveland, Single End

HAMMERS

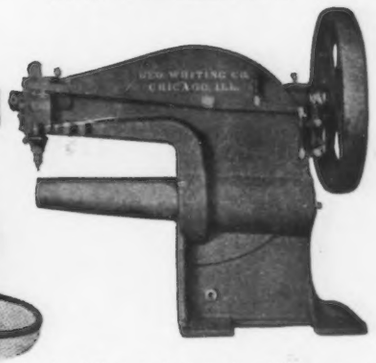


1—1100 lb. Chambersburg Steam Hammer
1—800 lb. Double Frame Miles Steam Hammer
1—800 lb. Board Drop Billings & Spencer Hammer
1—No. 4 Automatic Standard Hammer
1—60 lb. Cushioned Bradley Hammer
5—200 lb. Cushioned Bradley Hammers
1—50 lb. Size B Moloch Power Hammer
1—Style B. Blacker Power Hammer
1—125 lb. Kane and Roach Power Hammer
1—No. 2 Pettingel Power Hammer
1—100 lb. Little Giant Moloch Power Hammer
1—No. 5 Beaudry Champion Power Hammers
2—250 lb. Mayer Power Hammers
1—No. 3 Beaudry Power Hammer

TESTERS

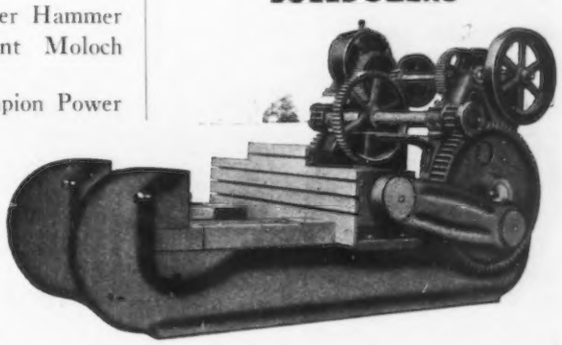
1—100,000 lb. Riehle Brake Beam Tester
3—Tinius Olsen Dynamic Spark Testers
1—Tinius Olsen Spring Tester
1—Pratt & Whitney Comparator
1—Scott Cloth Tester
1—Cam Checker

RIVETERS, MISCELLANEOUS



1—No. 1 Long & Allstatter Punch & Stake Riveter
1—No. 4 Long & Allstatter Punch & Stake Riveter
1—New Doty, Stake
1—Rock River, Stake
1—Type NC Kobert, Electric
1—Style C Berwick, Heaters
1—No. 3 Berwick, Electric Bar Heater
1—No. 107 Grant, Spinner

BULLDOZERS



1—No. 5 Williams & White
1—No. 6 Williams & White
1—No. 4 Ajax
1—No. 7 Ajax
1—No. 9 Ajax
1—No. 7 Blakeslee

LOUIS E. EMERMAN & CO.

CHICAGO, ILL.

THE CLEARING HOUSE

IT TAKES *"Dependable"* MACHINERY FOR PRODUCTION

LATHES

42"x25' PUTNAM
36"x18' PRENTISS
27"x16' NEW HAVEN Heavy
24"x12" PUTNAM, QCG
24"x14' REED-PRENTICE Geared Hd.
22"x16' REED light pattern, cone
18"x10' RAHN-LARMON
19"x8' LEBLOND Hvy. Duty, Pl. Turning
18"x6' SOUTH BEND
16"x6' SOUTH BEND
14"x6' MONARCH Geared Hd.
12"x5' CHAMPION Pl. cone
10"x4' DAVIS Pl. Chnge.
10"x24" centers, LOGAN (new)

KEYSEATERS

#3½ BAKER—72"x3"
#1 LAPOINTE horiz. Broach
#4 LAPOINTE horiz. Broach
12" NEW HAVEN Slotter, Rotary Table

TURRET LATHES

#4 MILLHOLLAND-LASSITER, Staybolt Threader
#7 FOSTER UNIVERSAL, 2 9/16" cap.
21"x3½ hole, GISHOLT UNIVERSAL (2)
24"x5" hole, GISHOLT UNIVERSAL

AUTOMATICS

1¼ GRIDLEY Model "F" 4 spdle.
9/16 GRIDLEY Model "G" 4 spdle. (2)
#24 PRENTICE-NEW BRITAIN auto. Chucker
#23 PRENTICE-NEW BRITAIN auto. Chucker
12"x6" JONES & LAMSON "Hartness" Chucker

PIPE MACHINES

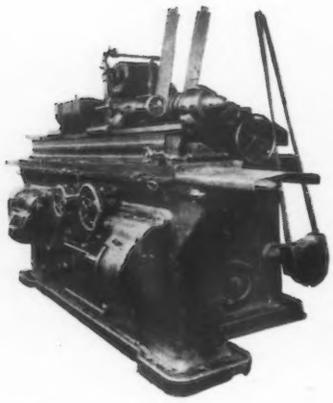
18" SAUNDERS, M.D.
12" MERRILL, M.D.
6" WILLIAMS, M.D.
4" CURTIS Portable, M.D.
2" LANDIS, belt
2" JARECKI, belt

GRINDERS

GARDNER #14 double opposed disc
BESLEY #6 double opposed disc
GORTON 24" DISC and Ring Wheel
GARDNER #4 DISC 23", Ring Wheel 16" Universal Tables, belt dr.
CINCINNATI #2—12"x36" CYLINDRICAL, M.D.
SPRINGFIELD FACE GRINDER, 12" CUP WHEEL
ROGERS 60" KNIFE GRINDER
FLOOR GRINDERS, B-LINE (NEW) 12x2 Wheels, 2 horse power, Ball Bearing, fully enclosed, adj. Wheel Guards, exhaust Takeoff, electric lights, Tool supports, in-built switch. $175. Any voltage.

GEAR MACHINERY

GLEASON GEAR TESTER
WHITON #2 SPUR GEAR CUTTER, 36" cap.
BARBER-COLMAN #12 HOBBER
GOULD & EBERHARDT 36" Victoria Model
GOULD & EBERHARDT #36B, Spur and Bevel
ADAMS #1 Gear Hobber
VAN NORMAN Pinion Cutter, Small
VAN NORMAN Pinion Cutter 3" cap.



DRILLS

SIPP-FOOTE-BURT 4 Spindle, power feed and quick return
SIPP 2 Spindle #2 M.T.
AVEY 3 Spindle #2 M.T.
AVEY 2 Spindle #2 M.T.
LELAND-GIFFORD 2 Spindle #2, 10" Overhang
ALLEN 2 Spindle #2 M.T., Motorized
AVEY #3 Single Spindle Power feed, #3 M.T. 24"
AVEYMATIC Single Spindle with Power feed, 20"
100 Spindles of High Speed sensitive, Ball Bearing Drill Presses made by Avey, Leland-Gifford, Allen, Foote-Burt, Henry & Wright, Fosdick
New "BUFFALO" DRILLS—all sizes, many in stock.

THREADING MACHINES

ACME 1" Two Spindles, cone
LANDIS 1½" Two Spindles, cone dr.
NATIONAL 2" Two Spindles, Motor dr.
ACME 2½" Single Spindle, cone dr.
LANDIS 1½" Single Spindle, cone dr.

COMPRESSORS, AIR

12"x10" INGERSOLL-RAND ERI with A.C. 50 H.P. Slip Ring Motor, etc.
10"x8" LAIDLAW, arr. Chain Motor dr.
10"x8"x4" AMERICAN tandem Cyl. intercooler
8"x8" SULLIVAN horiz. belt dr.
6"x8" BURY horiz. belt dr.
9"x8" BLAISDELL horiz. belt dr.
4½"x4½" CURTISS VERTICAL belt
6"x6" CURTISS TWIN CYL. VERTICAL

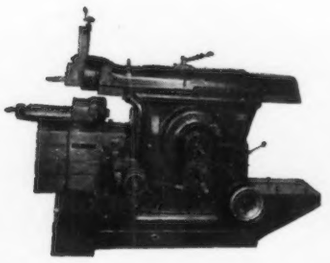
BUFFERS OR POLISHING LATHES

HAMMOND like new 10 H.P. type 10PP 3-60-220/440—8 months old

MULTIPLE PUNCH

CINCINNATI 60" 100 Ton, Geared
THOMAS Spacing Machine, 42" wide now arranged for plate shear 1¼"x42" cap. with table

SHUSTER WIRE STRAIGHTENER AND CUTOFF, ¼"x10'



SHAPERS

15" HENDEY Friction Dr.
20" STEPTOE, Back Geared, cone
20"x20"x24" PLANER-SHAPER, NBP

THREAD MILLERS

LEES-BRADNER 12"x54"
HALL PLANETARY #2—24" swing

THREAD ROLLERS

WATERBURY-FARREL #30, #10, #0 (2 ea.)

EYELETTING PRESSES

#158 WATERBURYS

DIE CASTING MACHINES

MADISON-KIPP #5—10x12 & 12x14 late

LO-SWING LATHE

8"x108" Heavy Duty, Geared Head
4"x104" old model, Geared Head
4"x60" old model, Geared Head
4"x48" old model, Geared Head

RADIAL DRILLS

3' Arm AMERICAN, Gear Box, SPD.
5' Arm NILES, flat col. motor dr.
5' Arm NILES, flat col. motor dr.

PRESSES

#3½C BLISS TOGGLE also #1
#93F TOLEDO Dble. Cr. Geared
#WFF Dble. Cr. S.S. Geared, 70 ton, 4" stroke, bed 30x26, 13" die space
#25N, #15N BLISS back flywheel
#2 BLISS Stiles type (10) also #1
#18—18C—#19—#19C—#20—BLISS, OBI
#25 NIAGARA ARCH, #30 BLISS ARCH
#16 NIAGARA HORN, Geared, Motor Dr. with Table, elev. and swing. 5"st
#44 V & O HORN, Geared, Table 24x24 2½" Str. Motor dr.
WICKES Dble. End PUNCH & SHEAR, 48" thro. cap. 1¼ thru 1¼
SOUTHWARK 520 Ton Hydraulic Press, with Lourie Pump. bed 30"x144"

MILLERS

INDEX UNIVERSAL VERTICAL (new)
CLEVELAND #1—cap. 2" End mill (new)
BECKER #7 LINCOLN TYPE
MISCELLANEOUS
CHICAGO AUTOMATIC THREADERS, BAKER AUTO. DRILLS; SLEEPER & HARTLEY AUTO. COILING MACHINES FOR MAKING SPEEDOMETER CABLE

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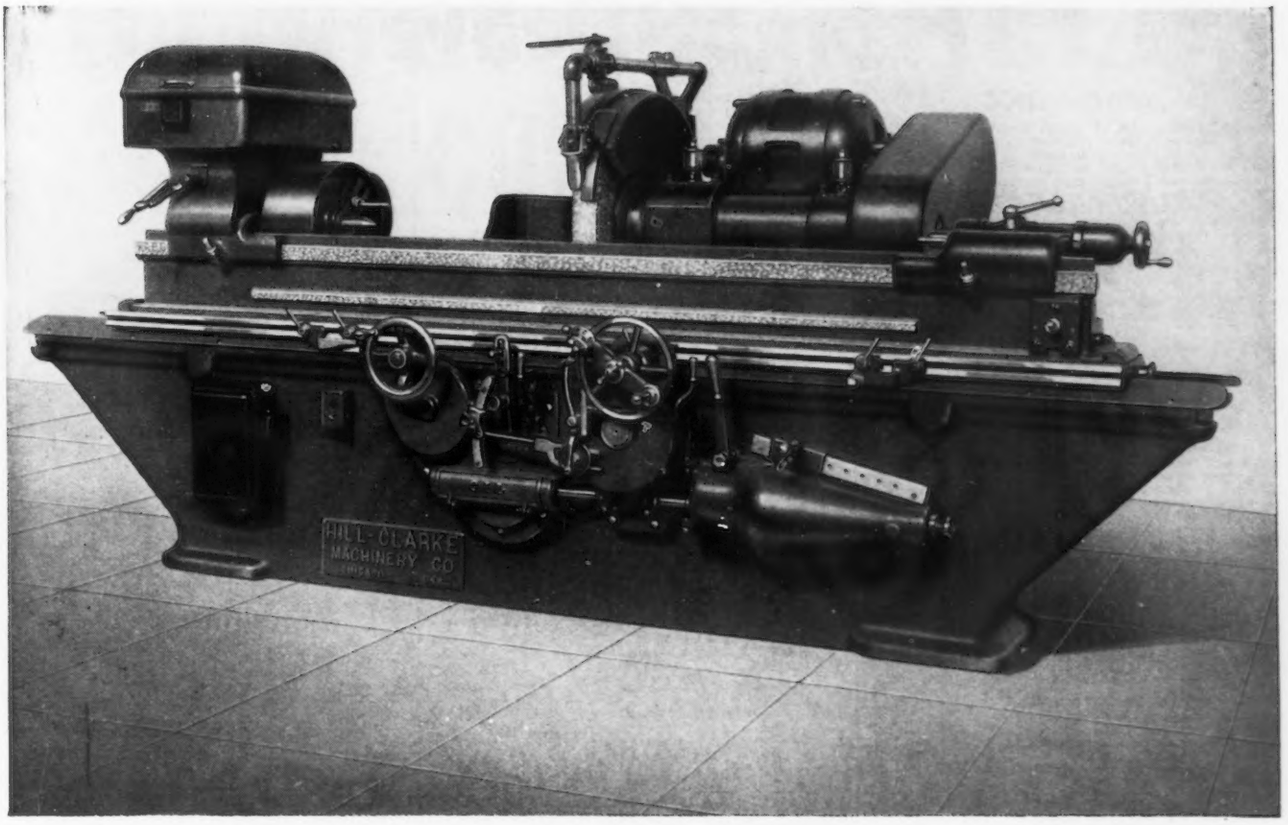
Send Us Your Inquiries Every Item Fully Guaranteed

FALK MILL SUPPLY CO., Inc.
Machinery Merchants
18 WARD STREET, ROCHESTER, N. Y.

THE CLEARING HOUSE

Grinders for Micro-Finish



HILL-CLARKE MODERNIZED CYLINDRICAL GRINDERS

give you a finish within a few micro-inches even when using standard grain free-cutting wheels. Contributing to this achievement is a patented multiple V-belt drive from a constant speed motor to the work spindle.

Throughout the machines there are refinements in design, fitting of components, minimized vibration which make possible extreme accuracy in all grinding operations. An accurately fitted wheel slide with cross feed screw mounted in ball bearings provides sensitive wheel control essential to duplicate work within close limits. Write for literature on Hill-Clarke Grinders available in the following sizes

10 x 36	14 x 36	14 x 72	16 x 72
10 x 50	14 x 50	16 x 50	18-30 x 96

HILL-CLARKE MACHINERY CO.

647 WASHINGTON BOULEVARD CHICAGO

THE CLEARING HOUSE

DEPENDABLE TOOLS

Prompt Delivery

AUTOMATICS

3—4½" Gridley Mod. H 4 spdl. chucking
6—6" Goss & DeLeeuw 4 spdl. chucking
1—No. 454 New Britain chucking
1—10" Bullard 4 spdl. Vert-Au-Matic chucking
1—No. 33 New Britain 5 spdl. chucking
1—No. 34 New Britain 5 spdl. chucking
1—1" Cleveland Mod. J double end
1—14"x19" Fay
3—No. 16 Gisholt Simplimatics

BRAKES

1—12'x10 ga. Geo. F. Ohl press type
1—4'x¼" Cincinnati press type

BULLDOZER

1—No. 29 Williams & White 16"x90" crosshead

BROACHES

3—No. 4 Lapointe, screw type
2—No. 3 Lapointe, screw type
2—No. 3 Lapointe double spindle, screw type
1—No. 1 Lapointe, screw type
1—3 ton American vertical, rack type
1—No. 2 (35 ton) Standard screw press

COMPRESSORS

2—136', 8"x8" Ingersoll Rand ER1
1—427', 14"x14"x16" Chicago steam
1—550' Westinghouse National 3 cyl. vert.
1—868', 17"x10"x12" Bury
1—1400', 20"x12"x14" Sullivan WN3

DRILLS

14—20" Upright, hand or power feed
2—20". No. 210 Barnes heavy duty
1—21" Weigel, SH, BG, PF, TA
2—21" Cincinnati stationary head
1—21" Cincinnati Mfg. type
2—24" Barnes all geared camelback
1—26" Barnes all geared camelback
2—26" Barnes, SH, BG, PF
1—28" Aurora, SH, BG, PF
1—32" Bickford, SH, BG, PF
3—16 spdl. No. 1 Baush multiple
1—16 spdl. No. 13 Pratt & Whitney multiple
1—10 spdl. No. 3 Fox multiple
1—16 spdl. No. 11 Natco rail type multiple
1—12 spdl. No. 11 Natco multiple
2—8 spdl. No. 12 Natco multiple
3—8 spdl. No. 12 Natco multiple tappers
4—12 spdl. No. 12 Natco multiple, one has tapping attachment
1—8 spdl. No. B12 Natco multiple
3—12 spdl. No. C12 Natco multiple
1—24 spdl. No. C13 Natco multiple
1—12 spdl. No. 14 Natco multiple
1—16 spdl. No. 22 Natco multiple
1—24 spdl. No. 14 Natco multiple
1—60 spdl. No. 32 Natco multiple
2—12 spdl. No. 41 Natco rail type
89—spindles of ball bearing sensitive
1—4' Hammond elbow arm radial
3—5 spdl. Detroit automatic
1—No. 00S Gawin duplex
2—Milholland duplex
1—Heavy Rockford duplex
1—No. 0 Gawin duplex
1—4"x12" Sundstrand duplex centering
1—8 spdl. No. 6 Moline Holehog
2—Edlund station type, index table
1—Foote Burt 3 way multiple
1—No. 8 H Natco horiz. mult., hydraulic
1—Barnes inverted drilling and boring, hydraulic feed
5—No. 15½, 15½D and 15½F Foote Burt production
1—24", No. H3 Barnes "Hydram," hydraulic feed, heavy duty

GEAR CUTTERS

3—No. 12 Barber Colman hobbers
3—No. 3 Barber Colman hobbers
1—26", No. 3 Brown & Sharpe spur
1—30" Flather spur
1—48", No. 4 Brown & Sharpe spur
1—60", No. 5A Cincinnati spur
1—No. 18H Gould & Eberhardt hobber
2—No. 1 Lees Bradner production hobbers
1—No. 5A Lees Bradner hobber
1—18" Gleason straight bevel generator
8—18" Gleason bevel testers
7—16" Gleason bevel lappers
4—15" Gleason spiral roughers
1—Gleason spiral pinion rougher
1—No. 6 Fellows gear shaper
1—No. 61 Fellows gear shaper
1—No. 62 Fellows gear shaper
1—Lipe 2 spindle chamferer
1—National Tool Co. gear cutter checker

GRINDERS

4—10"x36" Norton cylinrical
1—10"x50" Norton cylindrical
3—12"x36" Landis cylindrical
1—12"x36" Cincinnati cylindrical
1—No. 6 Bryant internal
1—No. 15A Bryant internal end face
1—No. 12 Greenfield "Hydroil" internal
3—No. 50 Heald cylinder internal
1—No. 60 Heald cylinder internal
1—18" Gardner No. 2 double disc
2—18" Gardner Semi automatic disc
2—24" Gardner No. 4 double disc
1—24" Gardner No. 84 opposed disc
1—53" Gardner No. 24 horizontal disc
1—12" Walker single stroke rotary surface
1—20"x50" Safety Emery Wheel surface
1—Pratt & Whitney thread or worm
2—17"x36"—48" Norton type B84 hydraulic crankpin
1—7½ HP Ransom electric snagging
2—Norton type D snagging
1—20" Taylor & Fenn wet tool
1—36" Bridgeport wet tool
1—24" Ingersoll tub milling cutter
1—Gisholt lathe & planer tool
1—2¼" Wilmarth & Norman drill
1—Norton type 15 lapper

HAMMERS

1—60 lb. Bradley cushioned helve
1—150 lb. Nazel air forging
2—No. 1 Pettingell bumping
1—No. 2M Pettingell bumping

KEYSEATER

1—2½" No. 4 Mitts & Merrill

LATHES

3—11"x36" South Bend engine, QCG
1—3½"x36" LoSwing
2—1"x18" Pratt & Whitney automatic
1—13"x6' Automatic threading
3—13"x18" Centers Seneca Falls "Short Cut"
1—14"x6' Lodge & Shipley with turret on carriage
1—20"x8' 6" Wickes geared head mfg
1—Melling camshaft lathe
2—Melling crankshaft lathes
1—27"x100" Centers Bridgeford axle

LATHES, TURRET

1—No. 2 Warner & Swasey
1—No. 2 Acme
1—No. 2 Southworth
1—No. 2 Stevens
1—No. 3 Woods
1—No. 4 Foster
1—22" Libby geared head univ. 4¼" hole thru spindle
1—22" Steinle geared head univ. 3 9/16" hole thru spindle
1—24" Steinle geared head univ. 6¼" hole thru spindle
1—28" Steinle geared head univ. 8" hole thru spindle
1—2¼x24 Jones & Lamson
2—3"x36" Jones & Lamson
1—2 spindle Jones & Lamson

MILLS BORING

1—3⅞" bar Beeman & Smith cylinder boring
1—4 15/16" Barrett cylinder boring
1—36" Niles car wheel boring

MILLING MACHINES

1—12" Pratt & Whitney automatic
4—No. 3 "Turnmilling" for milling round work
1—Model AB Becker vertical
1—No. 12 Brown & Sharpe mfg.
1—48" Oesterlein tilted offset
1—Type 10 Productomatic
1—Type 45 Productomatic
1—No. 1 Davis & Thompson drum type duplex
2—No. 1A Davis & Thompson drum type duplex
1—No. 6 Whitney hand

PLANERS

1—24"x24"x5' Gray
1—24"x24"x6' Woodward & Powell
1—29"x29"x6' New Haven

PRESSES

1—No. 4 Niagara OBI
1—No. 5 Bliss Consolidated OBI
1—No. 5½ Niagara OBI
1—No. A4 Niagara OBI
1—No. P2 Ferracute
1—No. PA3 Ferracute
2—No. 3 Bliss, stiles type
1—No. 62 Bliss openback
4—No. 76 Toledo openback
1—No. 6 Waterbury Farrel openback
1—No. 6½ Waterbury Farrel openback
1—No. 41A Toledo adj. table
1—No. 14½ Toledo adj. table
1—28", No. 71 Swaine double crank
1—No. 53 Toledo straight side
1—No. 8-7 Zeh & Hahnemann S.S.
1—No. 38½ Bliss straight side
1—No. 4 Massillon straight side
1—No. 7 Rockford straight side
1—No. 2 Standard, screw type
1—No. 180 Toledo toggle drawing
1—No. 796¼D Toledo toggle drawing
1—No. 6A Bliss cam drawing
1—750 ton Baldwin Southwark triple action hydraulic toggle
1—50 ton Lucas forcing
3—3 ton Fox Superflex forcing
2—8 ton General Flexible forcing
3—20 ton General Flexible forcing

PUNCHES

1—12" tht. Cleveland horiz., 1¼"x1"
1—12" tht. Long & Alslatter, 1¼"x1"
1—26" tht. Rock River, ⅜"x⅝"

RIVETERS

1—5/16", No. 3A High Speed
1—⅜", No. 4A High Speed
2—⅝", No. 5½B High Speed
1—1¼", No. 7B High Speed
1—20 ton Allen air, lathe column

SHAPERS

2—36" Morton draw cut with rotary feed

SHEARS

1—2" Newbold guillotine
1—1½" Lewis alligator
1—2" Hilles & Jones alligator
1—20" Pels beam, armorplate
1—No. 0-15 Stanley Unishear

SLOTTERS

1—14" Drill
1—No. 2 Garvin

TAPPERS

1—⅜" National precision nut
5—⅝", No. 1 Garvin
3—⅞", No. 2X Garvin
1—1½" National 6 spdl. nut tapper
1—Natco 1 way lead screw
1—Natco 2 way lead screw

THREADERS

1—½"x3" Manville thread roller
1—½" Acme 2 spdl.
1—⅝" Economy auto. stud
1—1½" Geometric
1—2" Landis two spindle
1—2" Landis two spdl. pipe & nipple
1—2½" Landis

UPSETTERS

2—1⅛" Acme
1—2" National overhanging ram guide
2—2½" Acme
2—4" Ajax
2—No. 1A Ajax forging rolls

MISCELLANEOUS

5—Higley coldsaws, 4", 7" & 8"
4—Butt welders 25 to 150 KVA
14—Spot welders 10 to 375 KVA
2—44" Norton balancers
1—Micropoise flywheel balancer
1—5" Huriburt Rogers cut-off
1—No. 6HS Langelier swager
1—No. 4 Torrington swager
1—48" Tolhurst oil & chip separator
2—Blakeslee metal washers
2—⅜" Shuster wire straighteners
1—⅝", No. 5 Sleeper & Hartley spring coiler

MILES MACHINERY CO.

Saginaw, Mich.

HYMAN-MICHAELS COMPANY

Iron and Steel Scrap
Relaying Rails
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Car Parts
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CHICAGO, ILL. SAN FRANCISCO, CALIF.
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Service • Quality • Dependability

EVERY MACHINE IN STOCK!

CHUCKERS & SCREW MACHINES

2—6¾" Cleveland Single Spindle.
1—No. 19 B & S Automatic.
1—2⅝" Model G Gridley.
1—⅞" Model G Gridley.
2—No. 23 New Britain Chucking Machines.
1—No. 23 Prentice Chucking Machine.

DRILLS & TAPPERS

1—6 Spindle Niles Rail Drill, No. 4 M.T.
1—2½' Fosdick Radial.
2—No. 12 Natco Multiple.
1—30" American Sliding Head Drill.
1—2 Way L. & G. Drill & Tapper.
1—3 Way L. & G. Drill & Tapper.
1—3 Way L & G Multiple Drill.
1—Rockford 5-Spindle Hyd. Drill and Borer.
1—Simplex Greenlee Multi Horizontal Drill.
1—Single Spindle L. & G. Drill 24" Hyd. Feed.
1—2 Spindle L. & G. Multiple Drill.
1—4 Spindle L. & G. Horizontal Drills.
2—4 Spindle Production Drills—No. 3 M.T.
1—6 Spindle L. & G. Horizontal Drills.
1—30" Barnes Upright Drill.
1—20" Single Spindle Cincinnati Drill Press.
1—Detroit 5 Spindle Horizontal Drill.
1—3 Spindle Reed Drill Press.
1—Barnes Universal Horiz. Drill, 2½" Spindle.
1—16" Fox Sensitive Drill.
1—No. 2BG Garvin Tapper.
1—Western 6 Spindle Multiple Drill, No. 3 M.T.

GEAR MACHINES

1—3 Spindle Gleason Bevel Gear Rougher.
2—18" Gleason Bevel Gear Generators.
1—36" Fellows Gear Shaper.
1—18" Gleason Bevel Gear Tester.

GRINDERS & LAPPERS

1—16"x80" Cincinnati Univ. M. D.
1—Cincinnati Brake Drum.
1—No. 3 Brown & Sharpe Tool.
3—No. 14 Gardner Opposed Disc.
1—8 Spindle Foote Burt Valve Grinder.
1—No. 6 Besly Double Disc Grinder—20" dia. discs.
1—Type P-4 Oliver Pedestal Die Filer.
1—12"x36" Modern Cyl. Grinder.
1—No. 65 Heald Grinder.
1—No. 1-F Norton Vertical Lapper.

HAMMERS

1—1100 lb. Erie Single Frame.
1— 800 lb. Bement Double Frame.
1— 600 lb. Erie Single Frame Forging Hammer.
1— 125 lb. No. 5 Power Hammer.

LATHES

1—16"x12' Greaves Klusman.
1—2¼"x24" Jones & Lamson Turret.
1—17"x8' Sidney.
2—Gisholt Simplimatics.
1—17"x6' LeBlond Engine Lathe.
7—20"x8' American Engine Lathes.
3—3½"x60" Lo-Swing Lathes.
1—42"x16' Putnam Lathe.
1—60"x20' Fifield Lathe.
1—12" Sundstrand Production.
1—20" Cincinnati Pulley.
1—No. 4 AC LeBlond Crankshaft Lathe.
4—19" LeBlond Universal Turret Lathes.

MILLERS

1—Nube Precision Die Sinker & Duplicator.
1—Newton 2 Spindle Profiler.
1—Taft-Pierce Thread Mill.
1—Holden-Morgan Thread Mill.
1—2 Spindle Ingersoll Openside Mill.

PRESSES

1—15 Ton Metalwood Hydraulic Pneumatic.
1—15 Ton Hercules Power Operated Arbor Press.
1—20 Ton Eastern Hydraulic Press.
1—Hannifin Arbor Press.
1—No. 64 Consolidated.
1—30 Ton Lucas Vertical Forcing Press.

SAWS

2—Higley Cold Saws.

MISCELLANEOUS

1—No. 3 Oilgear Hydr. Broach.
1—No. 1 P & H Horiz. Bor. Mill.
1—No. 0 Ajax Brake Shoe Key Forging Rolls.
2—1" Ajax Headers—cont. motion type—flywhl. dr.
1—No. 5½-B High Speed Riveter.
1—No. 10 Waterbury-Farrel Thread Roller.
1—No. 3 Thiel Die Filer.
1—2" National Bolt Cutter with Landis Head.
1—No. 3A High Speed Rivetting Hammer.
1—Toledo, 12 ft., 14 Gauge Power Shear.
1—2 Ton American Vertical Broach.
2—No. 3 LaPointe Broaches (screw type).
1—Teer, Wickwire Automatic Burr Cutter.
1—Type C Olsen Static & Dynamic Balancer.
1—No. 2 Mitts & Merrill Keyseater.
1—Coulter Automatic Threading Machine.
2—U. S. Eyelet Machines.
2—No. 156 Etna Swagers.
1—No. 1 LaPointe Broach.
1—Ajax No. 2 Bulldozer.
1—Reynolds Screw Driver.
2—No. 31 W-F Presses, Dial Feed.

MACHINE TOOLS
DONBERG D&D DANITS

400 SOUTH CLINTON STREET CHICAGO TELEPHONE WABASH 0123

WE OFFER
AVAILABLE FOR PROMPT DELIVERY
Subject to Prior Sale

CRANES, Locomotive
15-ton Brownhoist, 50' boom
20-ton Industrial, 50' boom
22-ton O. & S., 50' boom

CRANES, Gantry
McMyler Portal Pier, electric
Brownhoist Portal Pier, elec.

CRANES, Crawler
2-yd. Ind. Brownhoist, Type "BC" Steam — new in 1936.

10-ton Bay City, 40' boom, GAS Model 105 Northwest Comb. Crane, Shovel & Dragline, rebuilt

CRANES, Overhead
25-ton Bedford, 2 motor, 50' span, A.C.
10-ton Shaw, 3 motor, 48' span, D.C.
10-ton Northern, 3 motor, 51' span, A.C.

** Advise us of your crane needs!!! **

SHOVEL, 6½-yd. Bucyrus-Erie Electric Stripping, 320-B

BULLDOZER, No. 8 Ajax, motor driven

STEEL BUILDINGS
45'x170' with 7½ ton AC O.H. Crane
54'x245' with leantos and 2 O.H. cranes, 7½ & 5-ton, 50' span
50'x100' with extra 100' steel outdoor runway & 10 ton O.H. crane
50'x700' with leantos, prov. for craneway
250'x325' divided into 3 aisles and one aisle provided with craneway for O.H. crane

OUTDOOR CRANE RUNWAY
780' long—28' high

BOILERS
3, 300 H.P. B. & W., 160#
4, 450 H.P. B. & W., 180# Senousheader with stoker
1, 504 H.P. Sterling, 165# Class 2-30
6, 600 H.P. B. &. W., 183# with stokers
1, 650 H.P. B. & W., 225# steel header
1, 728 H.P. Erie 200# vertical with super heater

COMPRESSORS
1, 300 C.F.M. Chicago Pneumatic, Steam-driven
1, 475 C.F.M. Ingersoll-Rand, Steam-driven
1, 1000 C.F.M. Laidlaw Dunn, Steam-driven
1, 1440 C.F.M. Worthington, Steam-driven
1, 4000 C.F.M. Nordberg with 750 H.P. Diesel engine
2, 920 C.F.M. Sullivan with 150 H.P motor, 3/60/2200
1, 1055 C.F.M. Chicago Pneumatic with 170 H.P. motor
1, 1500 C.F.M. Nordberg with 275 H.P. motor, 3/60/2200
2, 1750 C.F.M. Ingersoll-Rand with 300 H.P. motor, 3/60/2200

ELECTRICAL EQUIPMENT

GENERATORS
7½ KW Westg. Turbo, 250 V. D.C., 30 amps.
40 KW G.E. Type MP 110 V. D.C. belt drive, 860 RPM, Form "H", 360 amps.
200 KW Westg. #201 SK compound wound, 600 V. D.C., with 290 H.P. syn. motor, 3/60/2200 and 900 RPM
500 KW Westg. 3/60/4100, direct connected to 250 V. Generator
1000 KW G.E. Type ATB-2-1250-3600, Form T 814 amps., 3/60/2200-900 RPM

HOIST MOTORS
2, 50 H.P. Ft. Wayne Elec. Co. Type "K" 600 RPM, 220 V. D.C.

USED A. C. MOTORS
20 H.P. Westg. Type CCL, 3/60/220, 850 RPM
25 H.P. A.C., 3/60/220, 1200 RPM
30 H.P. Westg., 3/60/220, 1800 RPM
37½ H.P. Lincoln vert. 3/60/220, 1200 RPM

USED D. C. MOTORS
3 H.P. G.E., 230 V. shunt wound, 1150 RPM
3 H.P. Reliance, 220 V., 600/1200 RPM
3½ H.P. West Elec., 220 V., 850 RPM
5 H.P. C-W., 220 volts, 950 RPM
5 H.P. Watson Vert., 1300 RPM
5 H.P. G.E., 230 V. compound wound, 850 RPM
5 H.P. C-W., 230 V., 950 RPM
5 H.P. G.E., 230 V. shunt wound, 1100 RPM
7½ H.P. G.E., shunt wound, 825 RPM, 230 D.C.
7½ H.P. Westg. #6 Type "S" shunt wound, var. speed
8 H.P. G.E., 230 V. D.C., 810 RPM
8 H.P. C-W., 220 V., 535/1070 RPM
10 H.P. G.E., shunt wound, 230 V. D.C., 650 RPM
10 H.P. A.C., inter. duty, 220 V. D.C., 500/1200 RPM
10 H.P. Triumph shunt wound, 230 V D.C., 760 RPM
13 H.P. Westg. #8 Type S, 220 V. D.C., variable speed 375/750 RPM
15 H.P. Westg., 230 V. D.C., Type SK, adj. speed 400/1500 RPM
15 H.P. Westg., 220 V. 500/100 RPM
20 H.P. A.C. Compound wound, 115 V. D.C., 1150 RPM
25 H.P. C-W. Type CCM, 115 V. D.C.
42/50 H.P. Westg., 220 V. D.C., variable speed, 500/1000 RPM, shunt wound
50 H.P. C-W., 115 V. D.C., Type CCM, 950 RPM
50 H.P. West. Elec. compound wound, 115 V. D.C., 850 RPM

USED A. C. MOTORS
(Squirrel Cage)

15 H.P. Howell, 3/60/440	600 RPM
15 H.P. Gen. Elec., 3/60/220	1200 RPM
15 H.P. Westg., 3/60/440	850 RPM
15 H.P. Wagner, 3/60/440	850 RPM
20 H.P. Howell, 3/25/440	750 RPM
20 H.P. Gen. Elec., 3/60/400	900 RPM
25 H.P. West. Elec., 3/60/440	865 RPM
25 H.P. Howell, 3/60/440	900 RPM
25 H.P. Gen. Elec., 3/60/440	1200 RPM
30 H.P. Westg., 3/60/440	840 RPM
30 H.P. Gen. Elec., 3/60/440	900 RPM
30 H.P. Gen. Elec., 3/60/440	870 RPM
35 H.P. Westg., 3/60/440	800 RPM
40 H.P. Gen. Elec., 3/60/440	1200 RPM
40 H.P. Gen. Elec., 3/60/440	900 RPM
40 H.P. West. Elec., 3/60/200	1140 RPM
40 H.P. Gen. Elec., 3/60/440	870 RPM
40 H.P. Westg., 3/60/440	870 RPM
50 H.P. Howell, 3/60/440	900 RPM
50 H.P. Watson, 3/60/440	1720 RPM
75 H.P. Gen. Elec., 3/60/440	900 RPM
75 H.P. Westg., 3/25/400	450 RPM

WE ALSO HAVE ON HAND MISCELLANEOUS ELECTRICAL ITEMS SUCH AS OIL SWITCHES, OIL CIRCUIT BREAKERS, LIGHTING GENERATORS AND COMPENSATORS.

MISCELLANEOUS
BUCKETS, 2, 5-ton Hulett Ore
1, 3-yd. Power Wheel
HAMMER, 1500# steam, single frame
LADLES, 8, 120-ton, top pour O.H. Type
1, 95-ton Pugh Ladle & Car
LATHES,

36" Niles, center drive

Boye & Emmes, 28" swing
Niles - Bement - Pond. 36"x14' heavy duty quick-change
42"x16' Fifield Engine Lathe
96"x32' Niles double back-geared Lathe

PIPE THREADING MACHINES
1, Landis, 1" to 4"
1, 4-B Williams, high production
1, 2" Bignall & Keeler
PUMP, 1500 GPM Dayton-Dowd Cent. Underwriter's Fire Pump with 1500 H.P., 3/60/440 V. Motor
SANDSLINGER, Beardsley & Piper, "S"
SAWS, Cold — various types up to 12" sq.
SHEARS, #3 Ryerson Lennox Bevel, 1" cap.
#7 Lever (Alligator Type) left-hand cap. 6½" sq. or 4"x24" soft cold steel, speed 12 cuts per min.

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37 YEARS' EXPERIENCE

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USED MACHINERY DEALER HELPS WIN WAR . . .

by keeping his eyes peeled . . . his ears to the ground . . . to detect and procure idle Machinery for War Work. Not an easy job in itself, yet he doesn't stop there. He burns telegraph and telephone lines to find idle machinery . . . then with his facilities rebuilds this Machinery so that it can be put to work promptly.

O'BRIEN OF PHILADELPHIA KNOWS HOW!!

That briefly is what we have been doing since the outbreak of the War *and for more than a quarter century before it.* Our entire organization and facilities are hard at work securing, rebuilding, and placing machinery for vital war needs. Finding employment for idle machinery for vital war needs. Finding employment for idle machinery on hand puts Victory into production faster than building new machinery. Because it contributes to Victory, it's a job of which we're proud.

As a result of our 27 years experience we now have on hand, not yet allocated, some very desireable MACHINE TOOLS and EQUIPMENT for the STEAM & ELECTRICAL POWER PLANT waiting to aid the war effort.

★ PARTIAL LISTING OF ITEMS IN STOCK, SUBJECT TO PRIOR SALE ★

AIR COMPRESSORS

1050 CFM Chicago Pneumatic type OCB, Size 19 x 12 x 14 with 150 HP, 2200 volt motor.
508 CFM Ingersoll-Rand 14 x 10 ER 60# Belted.
386 CFM Ingersoll-Rand 12 x 12 ER 115# Belted.
368 CFM Ingersoll-Rand 12 x 10 ER 100# Belted.
390 CFM Chicago Pneumatic 12 x 7 x 10 NCTB 100# Belted.
245 CFM Worthington 10 x 9 75# Belted.
136 CFM Gardner Denver 8 x 8 x 8 125# Steam Drive.

BORING MILLS

62" Betts vert. belt drive, 2 heads.

DRILLS

4-spindle Henry & Wright bb. #3 M.T. 12" overhang.
6-spindle National Acme Horiz. Drill belt drive.
1-spindle Allen bb. #2 M.T. belt.
1-spindle Henry & Wright bb. belt.

GRINDERS

2—#1 Gardner hyd. face, mtr. dr. table 10 x 30.
12" x 36" Pratt & Whitney, surface, belt drive.
2—#60 Heald internal cyl. 12 & 15" spindles.

LATHES

24"-48" x 12' McCabe 2-spindle, belt drive.
28" x 10' Crawford, meterized, quick change.
21" x 8' LeBlond, belt drive, dbg. quick change, belt.
20" x 14' Springfield geared head, s.p.d. quick change.
18" x 14' Hamilton, belt drive, quick change.
18" x 8' Ledge & Shipley, belt drive, dbg.

TURRET LATHES

28" Bogart belt drive 4" hollow spindle, heavy duty.
24" Gisholt, mtr. dr. 2½" hollow spindle.
25" x 10' LeBlond heavy duty, mtzd., quick change hex. turret on cross slide.
3" x 36" Jones & Lamson geared head, collet chuck.
3½ x 60 Fitchburg Lo-swing, single pulley drive.

MILLERS

5-Hand Milling Machines, table 4 x 18.
#3 Lees Bradner Thread Miller, mtzd.
#8 Becker Duplex, belt drive, table 11 x 48.
#104 Newton slab planer type, table 14 x 54.

MISCELLANEOUS

24" Bement single end Punch, belt drive, arch jaw, cap. ⅝ x ⅝.
#6 Cochrane Bly 24" Cold Saw, belt dr.
2½ to 8" Williams Pipe Machine, motor drive.
Henderson geared Forming Press, 40" between housings with dies.
200 ton Caldwell Wheel Press, 36" between bars, mtr. dr.
10" Buxton Slotter, 24" dia. table, belt drive.

We are representatives in the Philadelphia area for many of the leading national manufacturers of new machinery

THE O'BRIEN MACHINERY CO.

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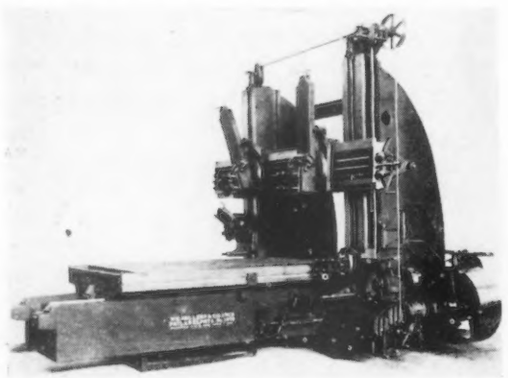
REBUILT MACHINERY FOR QUICK SALE

3" Landis Bolt Cutter, geared motor drive.
12" Bullard, Type A, Mult-au-matic; six sta.
3 way Garvin Drill; No. 4 taper, pwr. fd., index table.
1.2" Rhienna Gear Hobber.
12" Rochester Gear Tooth Rounder.
No. 20 Bryant Deep Hole Grinder.
Fischer Form Cutter Grinder.
No. 1 Sellers Tool Grinder, cap. 2½" sq. tools.
13"x8' Auto Machine Co.'s Threading Lathe, s.p.d.
13"x5' Auto. Machine Co.'s Threading Lathe, s.p.d.
14" Bardons & Oliver Facing Lathe.
American Fox Lathe.
3—24"x12' Williams Shell Boring Lathes, collet 6⅜"x 17½" deep.
RLUmS No. 26 Pels "Johns" Punch, 24" Throat.

16" x 24" Bliss Duplex Cold Strip Mill, 2-Hi, 2 coilers, 250 HP, AC Motor and control equipment.
16" x 24" Bliss Reversing Cold Strip Mill, 2-Hi, 1 coiler, 350 HP, AC Motor and control equipment.



72" x 72" x 12' Sellers Planer; spiral gear drive; braced housings; hvy. duty, boxed rail; wgt. 60,000 lbs., extra heavy rail and extra long rail head slides equipped with any number of heads desired.

18" Sellers Crank Slotter, 48" dia. table with 4-speed motor drive to suit current characteristics.

MISCELLANEOUS

12" Bement Crank Slotter.
12" Sellers Crank Slotter.
No. 6 West Hydr. Tire Setter, 18 cyl; 30"-63" Triplex Pump.
100,000 lb. Tinius Olsen Univ. Testing Machine.
36" Newton Cold Saw No. 200.

MACHINE TOOLS SALES COMPANY

509 N. 17th Street **Philadelphia, Pa.**

For Prompt Shipment

RE-BUILT

12" x 72" Cincinnati Plain Grinder: 4 Motors Including Master Speed Ranger: Motors 220 Volt, 3 Phase, 60 Cycle

Detailed Information on Request

Priority not necessary

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116 N. THIRD ST. (Walnut 5575) PHILA., PA.

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1—20x26 American 6 wheel switching engine with separate tender. Available for immediate delivery. Excellent condition.

1—19x24 American 6 wheel switching engine with separate tender. In excellent mechanical condition. Immediate delivery.

1—13x18 Vulcan type 0-4-0 standard gauge Saddletank. This is a fine 33 ton engine just completely overhauled. Immediate delivery.

1—35 ton standard gauge Westinghouse storage battery Locomotive. In very fine condition. Immediate delivery.

LOCOMOTIVE CRANES

1—15 ton Browning 8 wheel standard gauge, double drums, ASME boiler, 50′ boom. Now being overhauled. Due for completion about October 15th.

HOPPER CARS

5—50 ton all steel Hopper Bottom Coal Cars. Equipped with cast steel truck frames. 1680 cu. ft. capacity. Immediate delivery.

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WE WILL BUY INDIVIDUAL ITEMS OR YOUR ENTIRE SURPLUS.

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Every machine listed in this column is in our warehouse at press time.

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48" PUTNAM Car Wheel Borer
52" BETTS Car Wheel Borer
42" PUTNAM Car Wheel Lathe
42" NILES Car Wheel Lathe
48" NILES Car Wheel Lathe
85" PUTNAM Driving Wheel Lathe with Quartering Attachment, M.D.
27" BRIDGEFORD Journal Truing
Set of Locomotive Cylinder Chucks

THREADING MACHINES

2" B&K Pipe, LANDIS Head
2" B&K Motor Drive with motor
4" B&K LANDIS HEAD and cut-off
4" LANDIS with cut-off
6" B&K, cut-off, M.D.
10" STANDARD Pipe, S.P.D.
14" E.C.&B., S.P.D.
¾" GATERMAN Vert. Tapper
4" BAKER Vert. Tapper
16" BAKER Vert. Tapper

PUNCHES AND SHEARS

20" Throat H&J No. 00 ¾" x ⅜"
42" Throat L&A No. 2 1" x 1"
42" Throat H&J No. 2 1" x ⅞"
42" Throat H&J No. 4 1¾" x 1"
54" Throat H&J No. 5 1¾" x 1⅛"
60" Throat L&A No. A 1¾" x 1"
24 Throat L&A Double End ¾" x ¾"
RT 40 SCHULTZ-NAUMAN Beam Shear
6" x 6" x ⅝" Angle Shear
L&A Multiple Punch 6" x 72"
NIAGARA Circle Shear ⅛" x 18"
Washer Press, SOUTHWARK No. 3

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Price $1.00 Each In Any Size

New Low Prices. — Increase Production — Cut Operating Costs

Tools are tipped with Tungsten Carbide, and are suitable for machining cast-iron, brass, bronze, aluminum, non-ferrous materials (such as hard rubber, bakelite, fibre), and tough alloy steels up to 500 Brinell hardness.

Left—100 Series

Left Hand-Reverse Image, Right Hand Shown

Tool No. RH	LH	Shank Size
R-100	L-100	¼x¼x2
R-101	L-102	5/16x5/16x2¼
R-103	L-104	⅜x⅜x2½
R-105	L-106	7/16x7/16x3
R-107	L-108	½x½x3½

Right—200 Series

Tool No.	Shank Size
200	¼x¼x2
201	5/16x5/16x2¼
202	⅜x⅜x2½
203	7/16x7/16x3
204	½x½x3½

Below—300 Series

Tool No.	Shank Size
300	¼x¼x2
301	5/16x5/16x2½
302	⅜x⅜x2½
303	½x½x3½

STANDARD TUNGSTEN CARBIDE TIPPED TOOL BITS

In lots of 12 assorted in any Series; 100-200-300 Series an extra 10% will be allowed; also in lot of 50 assorted 20% discount will be allowed.

Sizes not listed as well as special TIPPED TOOLS will be quoted upon request. When ordering, state tool number and quantity desired.

We Carry Silicon Carbide Emery Wheels for Grinding Tungsten Carbide Tool Bits

VICTOR MACHINERY EXCHANGE, Inc.
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96 INCH GLEASON COMBINATION BEVEL and SPUR GEAR PLANER

CAPACITY: Bevel or Spur gears to 96" Dia. x 24" Face, unlimited pitch.
Motor Driven with 220 Volt DC 1000 to 1800 R.P.M. Motor.
With large assortment of cutters.

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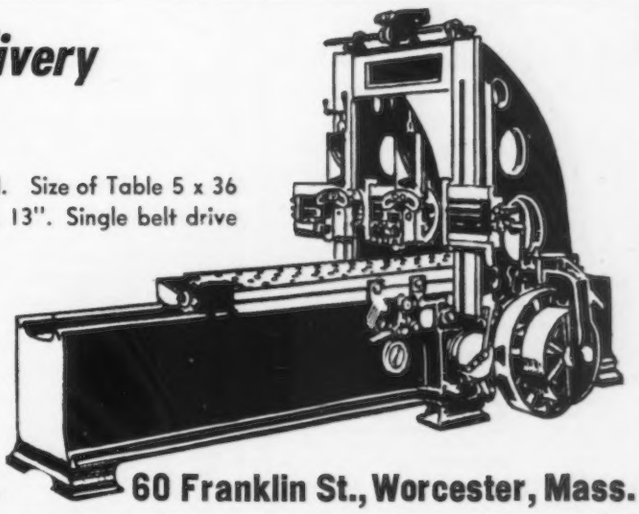

POND OF PLAINFIELD, N. J. 42 x 42 x 30' Bed. Size of Table 5 x 36 x 20' Bed. Two heads on Cross Rail. Width of Rail, 13". Single belt drive on Cut. Single belt drive on return.

WOODWARD-POWELL 36 x 36 x 18' Three Heads. Two on cross rail, one on the side, Motor drive. Size of Table 34" x 15'. Friction type feed clutch, rack feed to rail. Single belt driven rail elevating drive.

MARKS MACHINE TOOL CORP. 60 Franklin St., Worcester, Mass.

24" Gleason Straight Bevel Gear Planer.
2—10'-6" Ohl Power Press Brakes, 10 ga.
24" Newton Combination Cold Saw.
No. 8 Whiting Punch 24" Tht. 1 1/16" x 1".
14' Garrison Power Shear, 1/4" cap.
10' Dreis & Krump, all steel Squaring Shear.
2—6-sp. Leland-Gifford Drills, B.B.
Lewis 24" blade Alligator Shear, cap. 5".
No. 3-B La Pointe Broaching Machine.
No. 4 Adams-Farwell Gear Hobber.
27"x16' Bridgeford Lathe.
10"x10" Napier Band Saw.
4' Fosdick Radial Drill.
2—No. 3-F Foster Fastermatics.

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825 W. Evergreen Ave. Chicago, Ill.

PLANERS

1—24"x24"x6' POWELL PLANER, 1 hd.
1—24"x24"x8' GRAY PLANER.
1—60"x48"x14' BERTRAM OPEN SIDE PLANER, 3 hds., D.C., reversing M.D.
1—60"x60"x16' POND PLANER, 4 hds., D.C., reversing M.D.
1—72"x72"x16' CINCINNATI PLANER, 2 hds., heavy.

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1—Dings Magnetic Separator, Type AD
1—No. 62 Bliss Punch Press, M.D.
1—No. 1A Wm. Sellers Tool Grinder
1—No. 3 Holmes Tilted Tapper
1—No. 1 Garvin Tapper
1—No. 2 Baxendale Punch Press, M.D.
1—Universal Gear Tester
2—Toledo Electric Welders
1—No. 2X Hannifin Air Arbor Press

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122-126 Nebraska Ave. Toledo, Ohio

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DRILLS

1 spdl. Henry & Wright
1 spdl. Leland-Gifford
2 spdl. Leland-Gifford Bench
2 spdl. Henry & Wright
4 spdl. Sigourney
4 spdl. Woodward & Rogers
4 spdl. Henry & Wright
6 spdl. Henry & Wright

GEAR CUTTERS

No. 60BM Gould & Eberhardt Bevel Gear Rougher (2)

GRINDERS

(See page 561, Hill-Clarke Cylindrical Grinders)
22"x96" Norton Plain, Motor Drive, Roll Forming Attachment
No. 40 Bryant Plunge Cut, Wide Wheel, Oscillating
No. 10 Lees-Bradner Spur Gear Grinder
1½" dia. New Yankee Drill Grinder
No. 60 Heald Cylinder

LATHES

3½"x53" Fitchburg Lo-Swing
No. 4 AC LeBlond Auto. Duplex Crankshaft

SLOTTERS

10" Newton

MISCELLANEOUS

No. 3 Baker 2 spdl. Cyl. Borer
No. 4 Gaterman Tapper 5/16" cap

HILL-CLARKE MACHINERY CO.

647 W. WASHINGTON BLVD. CHICAGO

PUT THESE MACHINES TO WORK

MILLS

No. 1 Davis & Thompson, Drum Type, M.D. (2)
48" Ohio Tilted Rotary, Late Type
2 Newton Rotary, 1 Roughing, 1 Finishing, Cutter, M.D.
No. 3 Ingersoll Combined Horizontal & Vertical

AUTOMATICS

2¼" Single Spindle Gridley, Belt
⅝-⅞" Model B Cleveland
1¼-1½" Model B Clevelands (3)
¾" and 1" Model J Clevelands, double end threading
Lanco Die Heads, Magazine Feed
4¼" Single Spindle Model A Cleveland Complete

MISCELLANEOUS

No. 14 Natco Multiple Drills, 34 Spindles
6' Pond Radial Drill, M.D.
8" Landis Pipe Threader & Cut Off
7-1 Cleveland O.B.I. Punch Press, Fly Wheel
15 Ton and 30 Ton Lucas Forcing Presses
20 Ton Fox Superflex Straightening Press
8 Ton General Flexible Presses, 3 Post (3)
No. 3 Canton Alligator Shear, 16" Blade
36" Morton Draw Cut Shaper

Send us your inquiries

INTERNATIONAL MACHINERY COMPANY

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Available for Shipment

MILLING MACHINES

#1 Garvin, Universal
#1 Lambert-Heald, plain, motorized
#4 Becker, vertical
#8 Pratt & Whitney Automatics, 5"x16"

LATHES

14"x 6' Lodge & Shipley, quick change, dir. motr. dr.
20"x10' Walcott
20"x10' Monarch, quick change, taper attach.
20"x10' Rahn Larman, geared hd., quick change
20"x10' Lodge & Shipley, motorized
24"x10' Bridgeford, quick change gear, taper att.
38"x18' Bradford, taper att.

TURRET LATHES

2" Acme, bar and power feeds
21" Gisholt, 3½" spindle cap., 2 power feeds

VERTICAL BORING MILLS

36" Rogers, with turret and side heads

SHAPERS & PLANERS

20" Stockbridge, motorized
24"x24"x 6' New Haven Planer, 1 head
36"x36"x10' Gray Planer, 2 swiveling heads
42"x42"x12' New Haven Planer, 3 swiveling heads

GRINDERS

#1 LeBlond Univ. Tool & Cutter
10"x20" Landis Cylindrical, motorized
16"x50" Norton

GEAR MACHINERY

3"x36" Brown & Sharpe
24" Fellows Shaper

RADIAL DRILLS

2½' Mueller, motorized
5' Davis, motorized
5' Cincinnati, motorized

PRESSES & BROACHING MACHINES

#3 Ferracute, 2" stroke
#3 LaPointe Broaching Machine

MISCELLANEOUS

#16 Pels Univ. Punch & Shear, ⅝" plates, 4x4x½", angles, etc.
Hilles & Jones, 1" cap., 36" gap Shear & Punch
Sandbl. Cabinet 36x48"

NEW 6 x 18" SURFACE GRINDERS, MOTOR IN BASE

GRAHAM MACHINE TOOL, INC.

231 CENTRE ST. NEW YORK CITY
WOrth 4-8125-6

ROLL LATHES

54"x20' Standard, compound Geared Hd., for direct motor drive, with piano and necking rests. Used little. Fine condition.
42"x20' United, 4-step cone, with piano and necking rests and countershaft. Good condition. Both for quick shipment.

MISCELLANEOUS

Bulldozers, W-W., No. 0, belt.
Centrifugal Compressors, 1050 & 10,500 CFM.
Grinder, Cylinder, No. 5 Landis, M.D.
Lathe, 24"x14' Rahn-Larmon PCG, chuck, B.D.
Lathe, 72", short bed, no tailstock, M.D.
Lathe, 34"x18' Porter, 5-step cone.
Levelling Roll, 54"x4¼" McKay, 17 rolls, motor 3/60/440 V.
Motor, 10 HP. C-W., 230 V. DC. 1400 Rev. (new)
Planer, 36"x36"x12' Flather, 2-Hds, M.D.
Press, Hydraulic, 450-Ton, 4-column, bed 30x48", stroke 60", daylight space 84".
Press, DC. No. 6 Niagara, 36" betw. hsgs., M.D.
Press, No. 2 Manville SS. SC., 1¼" str., Plain (2)
Punch, SE. No. 1 L&A. 10" tht., cap. 1½"x1", plain jaw.
Punch, SE. No. 7 L&A. 4" tht., belted M.D., plain jaw.
Punch, Multiple, Bertsch, 48" betw. hsgs., M.D.
Reamers, 3⅛", 4¼", 4 5/16" adj. HS.
Reamers, 5½", adj. H.S. Kelly.
Shaft Straightening Mach., No. 3-A, Geier, Hard.
Shear, Rotary No. 15-A. Niagara, with Circl. Att.
Threading Mach., Auto. 2" Rickert-Shafer, boring & Chamfering tools, M.D.
Upsetter, Hydr. 260-ton Horiz. Upsetter, 24" stroke, with 110-T. Vertical ram, 15" stroke.
Welders, Butt, 200 & 300 KW. Winfield, 60 cy., 440 V.

GALBREATH MACHINERY CO.

306 EMPIRE BLDG. PITTSBURGH, PA.

HYDRAULIC PRESSES

1500-ton Hydraulic Press Mfg. Co.; stroke 12"; bolster plate 48"x48"; motor drive.
1500-ton R. D. Wood Co.; stroke 12"; bolster plate 48"x48"; motor drive.

BULLARD MULT-AU-MATIC

8" Six-spindle; motor drive.

RADIAL DRILLS

7-ft. Baush Plain; motor drive.
3-ft. American Sensitive; motor drive.

SUN MACHINERY COMPANY

36 Van Vechten St. Newark, N. J.

OTT MACHINERY SPECIALS

AUTOMATICS

Brown & S. #00 and #1 Cut-off
Cleveland, Model A 1 1/16", Magazine,
Model B 7/8", 1 1/16", 1½" and 2½",
Model G 7/8", 5-Hole Turret,
Model M 7/8" 4 spdle. M. D.
Gridley 2¼" & 4¼" Single Spindle
New Britain, #22 and #24 Chuckers
Potter & Johnston #5-A

BROACHES

#3 LaPointe Single, Screw Type, M. D.
#V-18 American Vertical, 6-Ton Capacity

DRILLS

Heavy Duty, Barnes 20" Camelback
Minster #9, #4 Morse Taper
Moline 6-Spindle #17-D Hole Hog
High Speed Ball Bearing, 1 to 4 Spdl.
Horizontal, Detroit 5-spindle Semi-Auto.
Radial, 3' Bickford and 3½' Fosdick
Sliding Head, 26" Mechanics #4 Morse T.
36" Superior, #5 Morse Taper

GEAR MACHINERY

Barber Colman #3 and #12 Hobbers
Brown & Sharpe, #3—36" Cutter
Fellows 36" Gear Shapers
Lees Bradner #5A Gear Hobbers
Barber Colman #3 Hob Grinder
Cross #1 Gear Tooth Rounder

GRINDERS

Cylinder, #65 Heald, Belt Drive
Disc, #14 Besley, 26" dia. disc
Internal, #3 Bryant, Motor Drive
#6, 15A, and 18 Bryant Internals
Plain, 10" x 36" Landis Type B, M. D.
10" x 36" Landis Type D.C., Hydraulic Table Traverse, Hydraulic Cross Feed, M. D., Late Type Machine
10" x 36" Norton, Countershaft
14" x 30"-36" Norton Type B-81, M. D.
14" x 36" Norton, Motor Drive
Spline, Universal, Excello M.D. Spdl.

LATHES

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60"/85" x 17' Putnam, L. C. G.
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MILLING MACHINES

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Duplex, #8 Becker and #2½ P & W
Production, Type A Briggs, B/D #32 Kempsmith, B/D
Rotary Drum Type, #1, 2, & 3 Craftsman
Spline, 2" and 4" Pratt & Whitney
Vertical, #2 Becker with Rotary Table
42" Ingersoll Rotary, 2 spdl. M. D.

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Deep Throat, #78-½ Bliss, M. D.
Horning, #25 Cleveland & #41 Toledo
O.B.I., #2-½ Bliss Consolidated
#2 Federal, M.D. and Dial Feed
#40 Perkins, 3" Crank, B/D
S.S.S.C., #64 Consolidated, B/D
Solid Back, Bliss, Ferracute & Toledo

MISCELLANEOUS

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Hone, Model MCAX Hutto 2-Spindle, M.D.
Lappers, Bethel Player, M. D.
Nibblers, #102 Gray and #1 Campbell
Profilers, 2 spindle Reed Prentice, Garvin and Pratt & Whitney
Riveters, #5A and 5½B High Speed Hammers
#6 Whiting Stake Riveter
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75 H.P. West., 1200 RPM. (5).
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60 H.P. West., 290 RPM.
(180 additional slipring motors, 1 to 50 H.P in stock.)

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50 H.P. West., 900 RPM.
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50 H.P. G.E., 720 RPM.
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15 H.P. G.E., 1350 RPM.
7½ H.P. G.E., 900 RPM.
5 H.P. West., 1100 RPM.
3 H.P. G.E., 1800 RPM.
(12 additional motors in stock, ¼ H.P. up.)

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165 H.P. Cr. Wheeler, 670 RPM.
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60 H.P. G.E., 900 RPM.
60 H.P. Roth, 600 RPM.
50 H.P. G.E., 850 RPM.

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40 H.P. El. Dyn., 1450/2600 RPM.
40 H.P. G.E., 1700 RPM.
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40 H.P. Reliance, 625 RPM.
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40 H.P. G.E., 440/800 RPM.
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25 H.P. G.E., 575 RPM.
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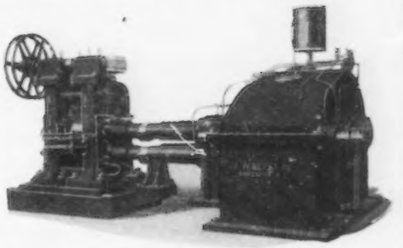
Single stand 16" x 24" Bliss 2-high Cold Strip Mill, hand wheel operated screwdowns. Steel rolls. Double reduction gear drive. Ratio 21.8:1. Mill pinions built into reduction gear unit. Direct connected 350 H.P. G.E., 720 RPM motor with controls, 3/60/440.



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SNYDER 2 WAY HORIZONTAL BORING, REAMING & DRILLING MACHINE; M.D.

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TONS	MAKE	SPAN	CURRENT
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1—7'x55' Vulcan, heavy duty, single shell dryer, suitable for use as dryer or kiln, ⅝" plate, new condition.

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5 ton ROBINS AND MEYERS floor control 440 AC Mono-rail hoist. Excellent mechanical condition—a bargain—only $1250.00.

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1200 KW, 325 lb. 625 deg. 3600 rpm 16.7 lb. B.P. New 1923. Had 5 years' service. Was connected to generator but no generator now with it.

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Many Sizes & Types — Large Stocks
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SPECIALS IN D. C. MOTORS

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1— 600	Whse.	Interpole	230	140/280
1— 600	G.E.	MPC	550	600/800
2— 350	G.E.	MPC	220	450
1— 300	G.E.	MPC	230	250/400
1— 300	G.E.	MPC	230	275/550
1— 270	Whse.	Interpole	500	250/400
4— 150	Whse.	SK-201	230	300/900
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1— 100	G.E.	MDS-108	230	460

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225/275 volt D. C.

3—1350/1650 K.W. Gen. Elec. Type HCC, 6000 amp., 225/275 volt; A.C. 6 phase, 25 cycle, 500 R.P.M., with Type AH Booster and 1600 K.V.A., Type HTH, 3 phase, O.I.S.C., 6600 volt transformer with taps.

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Direct connected to a 300 KW

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250 Volts DC

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Boilers — Turbos — Pumps, Etc.

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(3) Buffalo Forge 1200 cfm. @ 11 oz. 7x7 outlet, 9½ inlet, with 7½ HP. 220 volt, 3 ph., 60 cycle, 1750 RPM motors.

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12 Steel Buildings, 30' to 100' wide, 60' to 290' long

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IN SIZES FROM 1/8"-2"

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400 feet of 6"	300 feet of 10"
500 feet of 7"	300 feet of 12"

CHANNELS, MEDIUM OR HEAVY

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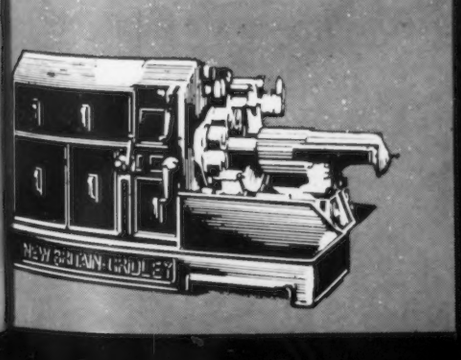

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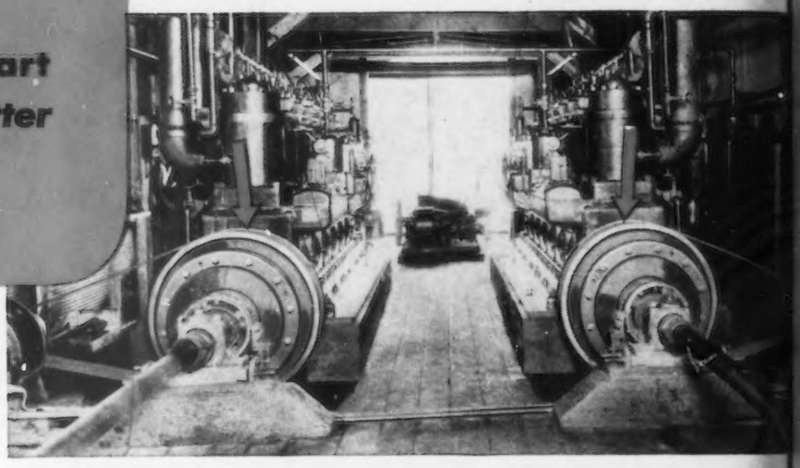

How to clutch a machine at the touch of a button

To start any machine smoothly, gently, automatically, install a C-H Magnetic Clutch between it and the motor. Then pushbuttons, limit switches, etc., clutch and declutch the machine at your will. Compact, space-saving, motor and machine-saving, time-saving.

WHEN you have to move tons of iron and steel, sort out small ferrous parts or separate "tramp" iron from mined, crushed or processed materials, let magnetism do the job. You will find a C-H lifting magnet or magnetic separator to meet every need. When you have to start machines with low-starting-torque motors, let magnetism do the job in the form of C-H Magnetic Clutches. When you have to stop and hold loads of any size, give the job to C-H Magnetic Brakes.

All these magnetic products are made by the manufacturers of the world-famous Cutler-Hammer Motor Control. They will give you the same high performance, *dependable* service. CUTLER-HAMMER, Inc., 1262 St. Paul Avenue, Milwaukee, Wisconsin. Associate: Canadian Cutler-Hammer, Ltd., Toronto, Ontario.

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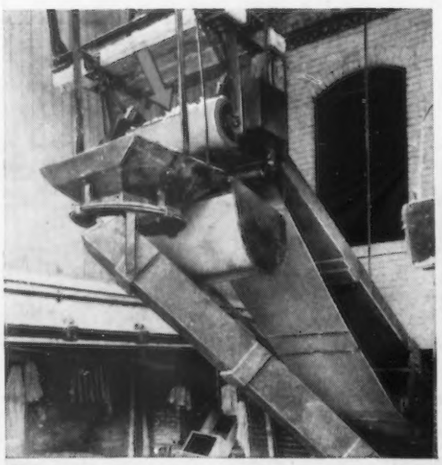
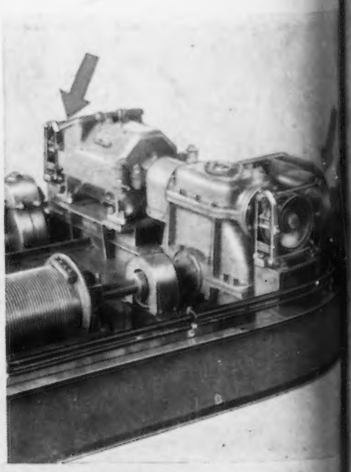


Bums' rush for Tramp iron

C-H Magnetic Separators guard materials in process, remove ferrous metal parts, scrap, etc. Prevent contamination of chemicals, foodstuffs, etc. Valuable in reçovering iron and steel scrap from garbage dumps, slag piles, etc.



When brakes are needed

To stop a conveyor, to spot a crane to hold a load, use a C-H Magnetic Brake controlled by any automatic contact arrangement or directly by master switch, pushbutton or automatic device. Smooth, jarless, cushioned, positive action.